THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES.

MAY, 1901.

THE PROTOZOON OF CANCER.

A PRELIMINARY REPORT BASED UPON THREE YEARS' WORK IN THE NEW YORK STATE PATHOLOGICAL LABORATORY OF THE UNIVERSITY OF BUFFALO.[1]

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Part I.

In January, 1899, at a meeting of the Medical Society of the State of New York, in Albany, the writer made a statement regarding certain observations made by himself in the State Pathological Laboratory. As these remarks appear in the *Transactions* of this society, they are as follows:

"Others have found organisms in cancer and have explained them as protozoa. Sanfelice and all observers of alleged parasites in cancer have noted the great variability of these forms in the tissue. As a result of our preliminary work, we think we have discovered the reason for this. We owe to Busse the knowledge of the fact that all staining methods are unreliable for such research. We therefore worked with the fresh methods, although we found at first that it was very confusing. We have discovered in all the cases of cancer so far examined that by fresh methods the organisms can always be found. These bodies resemble fat in the fresh state. It was only when we applied the ether test and the osmic-acid test that we discovered that they were not particles of fat.

[1] This article represents the report officially transmitted to the Legislature of New York conformably to the act establishing the New York State Pathological Laboratory at the University of Buffalo. No previous authorized publication has been issued. The author deems it due to himself to make this general disclaimer.

We next discovered that we could crack their edges with the cover-glass. There was no reason, even then, to believe that these might not be unusual forms of fat. We next injected them into the abdominal cavities of animals. Most of the animals developed peritonitis, and large quantities of these bodies could be obtained from the peritoneal fluid. In the last few days we have observed the round form develop under the cover-glass. They can be found in every cancer if properly sought for, and can be injected into animals and be recovered. They also change their form.

"We would not have made these statements were it not for a remarkable experiment at the beginning of this work. Dr. Park had a case of abdominal carcinosis. An exploratory incision was made, and a quantity of the serum from the abdominal cavity was given to me for investigation. It was in this fluid that we first found these bodies, and observed that they did not increase. After the fluid had been kept in the thermostat for three weeks we could still find the same bodies. They were then injected into the jugular vein of a guinea-pig, and three weeks and a half afterward, on killing the animal, we found a primary adenocarcinoma of the lung. This experience, we may say, is unique. The fluid had been carefully sedimented, and the fluid for inoculation taken from the top, so that it was not at all probable that cancer cells were actually introduced into the animal. In the case from which the fluid was taken the growth was a colloid carcinoma, but this was not the form of cancer which developed in the inoculated animal. It is also to be noted that carcinoma in the guinea-pig is extremely rare."

Since the period of this statement our attention has been principally turned to an investigation into the nature of these parasites, in attempts to demonstrate them in the tissue, and in attempts to cultivate them. The following is a detailed report of the experiment:

Case I. — S. N., a male, aged fifty-one years, a patient of Dr. Park. He was seen at his home, and presented physical signs of a large intraperitoneal tumor. The patient was removed to the Buffalo General Hospital, where an exploratory operation was performed by Dr. Park on August 12, 1898. Preparations had previously been made to collect aseptic fluid in sterile tubes and flasks. Dr. Park opened the distended abdomen with the usual aseptic precautions, and a sterile tube was inserted in the opening and about half a litre of the fluid was permitted to flow into a flask. Then three test tubes in succession were held beneath the running tube, and the remainder of the fluid was drawn off in separate flasks. The fluid which was removed from the peritoneal cavity was slightly blood-stained, but did not coagulate. The three tubes, labelled *a*, *b*, and *c*, were immediately placed in the writer's inside vest-pocket and were carried warm to the laboratory, where they were placed in the thermostat. The flasks were not treated in this manner, but were allowed to fall to the room-temperature and were not incubated. Inoculations upon bouillon, sugar-

water, and acid sugar-water, as well as agar and blood-serum, were at once made from all three tubes. A careful microscopical examination was likewise made of the peritoneal fluid, which was found to contain a few blood-corpuscles and some pale spherical bodies, in size varying from 2 to 10 micromillimetres. They were homogeneous, of pale, yellowish-green color, and at first were mistaken for fat droplets, although on closer examination their refractive index was seen to be too low. They were likewise resistant to ether, even when the fluid or tissues containing them were first treated with potassium hydrate, then centrifuged, washed in water, treated with 60, 80, 95 per cent., and absolute alcohol, washed in absolute alcohol and ether, equal parts, and then placed in an ether extractor for four days. When treated with osmic acid they failed to give the black reaction which characterizes fat. Attempts to stain them were partly successful, and it was found with cover-slips fixed by heat that although the bodies were greatly deformed by the process a certain number of them could be stained with carbol-thionin or the usual aniline dyes. Some of these bodies, though not very numerous, contained granular material, which showed marked Brownian movement. The tubes were examined from day to day, and we were able to demonstrate that these spherical bodies gradually increased in size, became more indefinite, and gradually lost their yellowish-green color. As they increased in size they apparently became more fluid and commonly sent out pseudopods and long projections. Fine colorless granules appeared in the protoplasm, and in some a delicate nucleus could be made out. Ultimately the larger forms of the organism became transformed into what appeared to be large sacs containing highly refractive granules and small spherical bodies, not unlike the free spherical bodies above described. The membrane of the sac was demonstrable as a pale colorless structure. The diameter of these sacs was on the average about 20 to 25 micromillimetres, or the size of a good-sized epithelial cell.

On August 19th 3 c.c. of tube *a* were injected into the peritoneal cavity of a female dog. On August 20th a fine surface growth was noted in tubes *a* and *b* of a small organism about the size of a coccus, which presented a peculiar bud-like growth and which resisted all attempts at cultivation. On August 25th 3 c.c. of fluid from tube *c* were injected into the jugular vein of a full-grown guinea-pig (Pig 1). On August 26th 4 c.c. of the same tube were injected into the peritoneal cavity of a second guinea-pig (Pig 2).

On August 29th the patient, who since the operation had not been doing well, died. Unfortunately the autopsy was begun by the attending physician, who opened the abdominal cavity and had already contaminated its contents before the peritoneal fluid was collected.

The following is extracted from the autopsy notes:

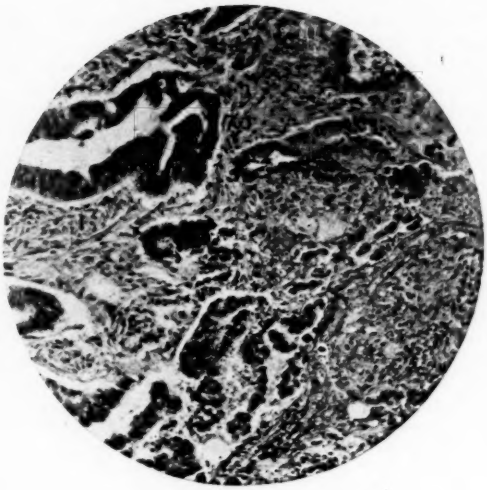
Autopsy four hours after death. Body of a well-formed, middle-sized man. Muscular structure well developed, skin pale, fat scanty. Peritoneal cavity contains a large amount of serosanguineous fluid. The peritoneum is greatly thickened, contains a large number of translucent vesicles, which are likewise scattered over the entire peritoneal surface, including that of the liver and the under surface of the diaphragm. The pelvic cavity is entirely filled with these gelatinous masses. On

removing the enlarged omentum it is found to measure 95 cm. in the long axis. Its greatest thickness is 12 cm. After removing the omental tumor the intestines are apparently free, except a large encapsulated mass of gelatinous material near the ileocæcal junction, apparently involving the lumen of the intestine. Intestines are removed without difficulty, when the tumor in the neighborhood of the cæcum is found to be firmly attached to the peritoneal wall, is apparently of a cystic nature, and contains a mass of gelatinous material. On opening the intestine no connection between the lumen of the cæcum and the tumor mass can be detected. The tumor mass, however, involves the appendix, which is obliterated. The spleen is dark red in color, and weighs four ounces. The right kidney is embedded in a mass of gelatinous material. The capsule of the kidney strips easily, the diameter of the cortex is 5 mm., of grayish-rose color. The papillæ are anæmic. Kidney pelvis unchanged. Left kidney same as right. The gelatinous material in the pelvis fills in the space between the rectum and bladder. The entire under surface of the diaphragm is thickly infiltrated with gelatinous vesicles. The liver is adherent to the diaphragm, and the suspensory and round ligaments are thickly infiltrated with gelatinous material. The gall-bladder is distended; the gall-duct patulous. On section the liver presents a typical nutmeg appearance, and the substance of the organ is apparently not at any point invaded by the gelatinous material. On opening the thoracic cavity the lungs extend well forward; pericardial sac contains a small amount of clear, straw-colored fluid. On opening the pericardium the heart is somewhat small, the heart muscle of a pale, brownish color. In the right ventricle is a large rose-colored clot, which extends into the pulmonary artery. The lungs contain a normal amount of air, show grayish and red mottling, but no evidence of metastases. Projecting into the left pulmonary artery is a large thrombus, adherent at various points and extending into the branches of the pulmonary artery. The bronchi contain frothy exudate. The right lung presents the same characteristics as the left, and the right pulmonary artery likewise contains a thrombus. The transverse and descending aorta shows a moderate amount of sclerotic change. The bladder and genito-urinary tract are free from abnormalities. The omentum and the cystic mass attached to the cæcum were removed and preserved for further examination.

Anatomical Diagnosis. Colloid carcinoma of the peritoneum; thromboses of the pulmonary arteries; atheroma of the aorta; brown atrophy of the heart muscle.

The microscopical examination of the fresh material from the vesicles of the tumor shows it to consist of a finely granular or homogeneous material, containing a considerable number of degenerated epithelial cells and the small spherical bodies noted in the peritoneal fluid. Examination of the peritoneal fluid from the cadaver showed that it likewise contained large numbers of the various forms of the organism. Portions removed from different parts of the tumor were hardened in various hardening reagents. The examination of the hardened and stained sections shows the tumor to be an adenocarcinoma of the omentum, which has undergone advanced colloid degeneration. The gelatinous vesicles show the typical appearance and characteristics of colloid carcinoma. They penetrate between the muscle fibres of the diaphragm into the layers of the capsule of the liver and involve the

PLATE I.



1.

Adenocarcinoma. Case I. (M. P.) (H. E.)

2.

Colloid mass from under surface of liver. Case I. (M P.) (Methylene blue.)

entire thickness of the omentum. The muscle fibres or connective tissue structures are forced apart by the gelatinous material.

In the neighborhood of the cæcum the colloid degeneration of the intestine is not so marked as in the other portions. Here the epithelial structures may be seen invading the abdominal wall and the mass of adherent structures which surround the growth. The description of a section from the growth in the neighborhood of the cæcum and one from the colloid portions of the tumor will include the principal characteristic features.

Slide 2. A section taken from the region of the primary tumor, hardened in alcohol, stained with Delafield's hæmatoxylin, includes a portion of the subperitoneal fat and the wall of the tumor. The connective tissue stroma of the section is thickly infiltrated with round cells. In the deeper portions of the section are a number of muscle fibres, likewise infiltrated with round cells. Extending through the entire thickness of the section are large, epithelial, glandular structures and nests of isolated cylindrical epithelium. (Plate I., Fig. 1.) Near the surface of the tumor these glands are broken up, and the epithelium is scattered through the stroma without definite arrangement. The cylindrical form of the epithelium is likewise changed, and here and there concentric structures closely resembling epithelial pearls may be noted. In the large glandular structures the epithelium is commonly several layers deep. The nuclei are large, deeply-stained, of irregular form and irregularly placed. The protoplasm of the cells stains deeply. Karyokinetic figures are uncommon. When examined under high power a number of the cells are found to contain typical Plimmer inclusions and the various forms beginning with small spherical bodies known as Russell fuchsin bodies and certain deeply stained bodies within the nuclei and protoplasm of the cells, which we now recognize as the younger forms of the parasite.

A portion of the tumor covering the under surface of the diaphragm, the surface of the liver and the peritoneal surface, which shows the typical vesicle formation characterizing this growth, reveals, on microscopical examination, the typical appearances and structure of an adenocarcinoma in an advanced stage of mucoid degeneration. The description of a single slide will suffice.

Slide 10, from material hardened in Flemming's mixture, embedded in paraffin and stained with iron hæmatoxylin Bordeaux red, through a large mass of gelatinous material from the under surface of the diaphragm. Tumor is divided into large vesicular structures, which, under the microscope, are divided up into smaller vesicles. These are filled with coagulated material, in which are embedded a number of epithelial cells in various stages of mucoid degeneration. The nuclei of these cells are somewhat smaller than those seen in Slide 1. In some of the vesicles the cells are of a typical cylindrical type, arranged in rows in the usual manner found in adenocarcinoma. Nearly every cell contains a large vesicle apparently filled with mucoid material. In some of the vesicles the cells are scarcely discernible, only occasional chromatin granules and indefinite masses of protoplasm marking the site where the cells once existed. The stroma is thin, contains but few nuclei, and occasionally, at the intersections, a few fat cells and a well-defined round-celled infiltration. The nucleus of nearly every cell contains a deeply stained body (nuclear infection). The occasional

vacuoles filled with mucoid material present an entirely different appearance from possible Plimmer inclusions.

Slide 12, taken from a mucoid portion of the tumor, near the site of the original tumor. Material hardened in sublimate, stained with methylene-blue. The tumor is made up of large and smaller vesicles filled with mucoid material. Within the vesicles may be seen the remnants of adenomatous structures, the epithelium of which shows marked mucoid degeneration. Under high power the cells of this portion of the tumor are found to closely resemble the adenomatous structures seen in Slide 2.

Slide 13. Section of a large mucoid mass removed from the under surface of the liver, stained with methylene-blue. The vesicles of this section contain deeply-stained masses of mucoid material. These are sharply delimited against the underlying structures. Embedded in the material are the fragments of degenerated epithelium. No well preserved epithelial elements are present. (Plate I., Fig. 2.)

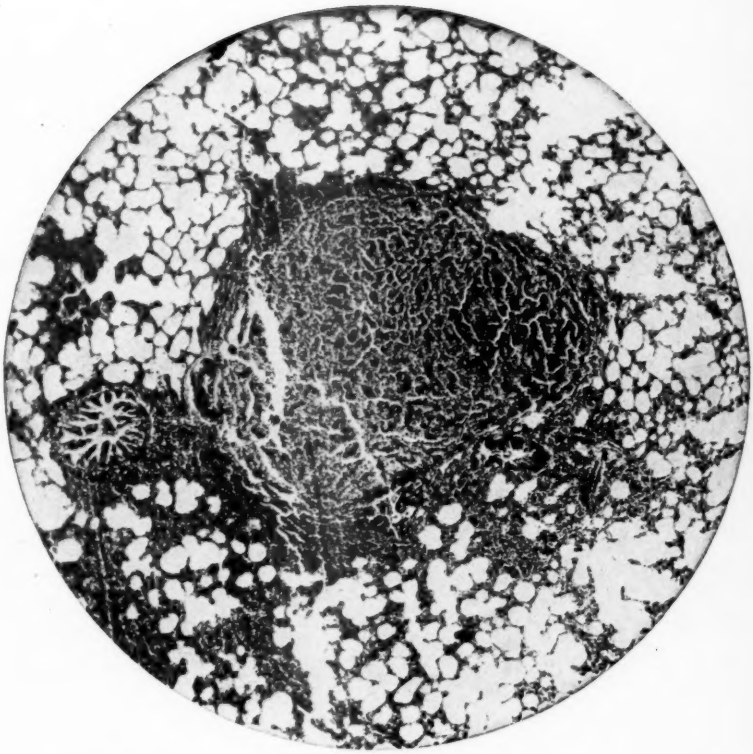
Cultures made from different portions of the tumor were all bacteriologically negative. The usual forms of bacteriological culture media were employed. These were placed under aërobic and anaërobic conditions.

On September 6th the following note appears in the *Laboratory Journal:* "Guinea-pig No. 1 shows distinct evidence of listlessness and does not appear well. The animal sits in the corner of its cage and does not move about." On Wednesday, October 14th, both Pigs 1 and 2 were killed.

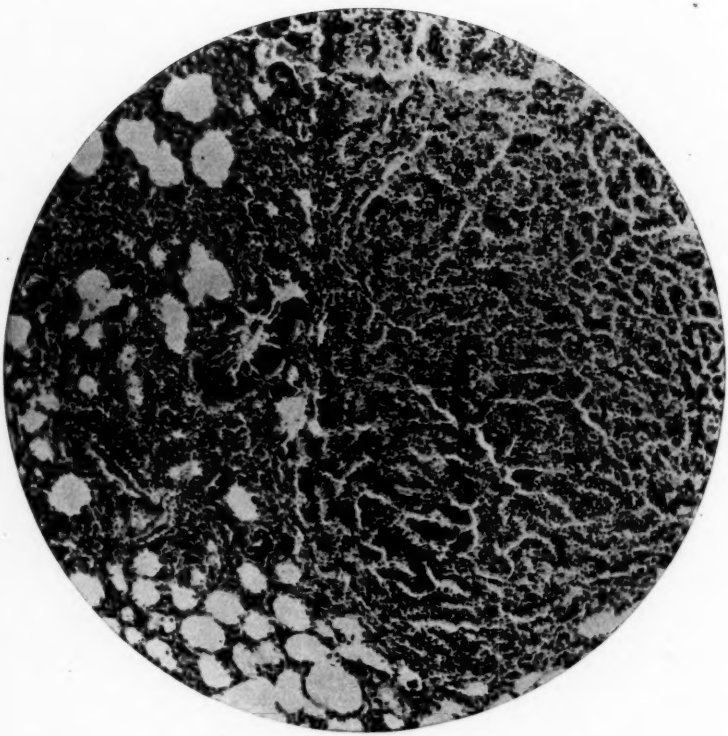
The following notes taken from the autopsy of Pig 1 will be of interest:

Inspection of the site where the injection of the serum was made in the right jugular shows that the superficial wound has healed, and at the point of ligation the jugular vein is transformed into a fibrous cord. On opening the thoracic cavity nothing of interest is to be noted until the lungs are reached. These are found to contain a normal amount of air. The pleura appears slightly injected. On opening the pleural cavity cultures are made from the lung surface. The lungs contain a large amount of pigment and show areas of venous engorgement with occasional minute hemorrhages beneath the pleura. After removing the lungs and incising them, both are found to contain a large number of minute nodules varying from the size of a pinhead to one larger than the rest, about the size of a grain of rice. These nodules are white, of greater consistence than the lung tissue, and somewhat elevated above the cut surface. Careful examination shows them to be located near or surrounding the small bronchi. The small areas of hemorrhage noted on opening the thoracic cavity are found to be confined to the region immediately beneath the pleura. On examining the abdominal organs the stomach is found to be empty, the intestines collapsed, the bladder widely distended with urine, and the cortex of each kidney of a deep red color. The capsules strip with some difficulty, and the stellate vessels directly beneath the capsule are slightly injected. The spleen is somewhat enlarged, shows a mottled, bright-red, and reddish-brown appearance. On incision the follicles are unusually large and stand out plainly against a background of deep red and reddish-brown pulp. Fresh microscopical examination of the heart's blood shows it to contain,

PLATE II.



Section of Lung, Pig I, including the largest nodule. Primary Adenocarcinoma following injection of protozoa in peritoneal fluid of Case I. (Low Power.)
(Hæmatoxylin Eosin.)



Margin of nodule (Plate II) showing origin of tumor from epithelium of bronchus. (Middle Power.)

beside the normal constituents of the blood, a large number of small, spherical, highly refractive bodies closely resembling fat, which in size and appearance are identical with those found in the original fluid with which the animal was injected. Aside from the minute white nodules in the lung, the pigmentation and enlargement of the follicles of the spleen and lymph nodes, and the injection of the kidneys, the remaining organs of the animal show no abnormalities. The lungs were hardened in formalin.

A large number of sections were cut, some of which include the largest nodule above mentioned. On examination with low power of a section stained with Delafield's hæmatoxylin, the nodule is readily found by the deep staining of the structures which compose it. On closer scrutiny, even with low power (Plate II.), the structure presents the appearance of a rapidly-growing nodule possessing a definite structure. The lung trabeculæ in the immediate neighborhood, especially in a portion adjacent to a bronchus, shows marked interstitial thickening. In the immediate neighborhood is a section of a middle-sized pulmonary vessel and a good-sized bronchus. The remains of a collapsed bronchial artery are seen just at the periphery of the growth. The alveoli of the lung show marked concentric flattening about the periphery of the nodule. A few yellowish-brown spots indicate the presence of pigment within the growth. Under high power the structure of the nodule becomes distinctly apparent. (Plate III.) It is made up of epithelial cells arranged in a characteristic manner upon a delicate connective tissue stroma. This forms the axes of longer and shorter papillary projections, which are closely packed together. Upon these are arranged single and double rows of cylindrical epithelium. At the periphery of the growth the alveoli of the lung are concentrically flattened, and the structure of the adenoma merges gradually into the structure of the lung trabeculæ. In one or two points the adenoma is spreading into the surrounding tissues, and in these localities the trabeculæ of the lung show a marked thickening and a distinct round-celled infiltration.

Under still higher power the nature of the epithelial cells may be more distinctly observed. They are fairly uniform in size, the cell protoplasm is abundant and palely stained. The nuclei are oval, are placed near the base of the cells, and stain deeply. The cells are cylindrical in form, but at the periphery, where the compression is great, they show evidence of considerable distortion. Included within the tumor are a number of cells containing coal pigment, and in the stroma are a few capillaries containing blood cells. In the neighborhood of these capillaries are occasional connective tissue cells loaded with hæmatogenous pigment.

The bronchial vessel lying directly at the margin of the growth is collapsed; the intima shows proliferative changes; the media is somewhat thickened. The adjacent pulmonary vessel is surrounded by a thick layer of cells, which apparently spring from the adventitia of the vessel. These are of the typical round-celled variety, and in certain portions are accumulated in groups, forming well-defined nodules. Careful scrutiny of the surrounding pulmonary tissue, especially in that portion in which there is great thickening of the trabeculæ, shows this change to be due to a proliferation of the connective tissue stroma of the lung. A large number of cells closely resembling the *epithelial*

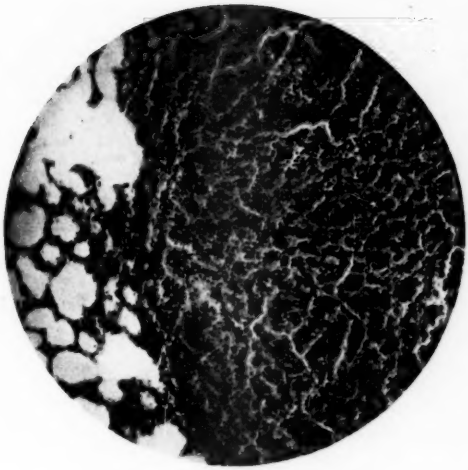
cells of the lung are mixed with these. A certain number of the last-mentioned elements contain deposits of coal-dust. An examination of the other pulmonary vessels of the lung reveals the same proliferation of the adventitia, and many of the smaller vessels are surrounded by nodes or rings of closely packed round cells. (Plate IV., Fig. 2.) In various other portions of the lung are areas in which the trabeculæ are thickened or the alveoli completely obliterated. Within these areas will be found nests of epithelium, and in the larger, well-defined adenomatous structures identical in appearance with that of the largest nodule. (Plate IV., Fig. 1.)

Since the acquisition of Plimmer's method we have restained sections of this case, and find that every epithelial cell in the nodule contains a deeply stained nuclear body, which we now recognize as young parasites. The lung trabeculæ are infiltrated with large numbers of young organisms, which can only be recognized from round cells by their form and homogeneous nature. They are either round or oval, or appear to have been hardened in the act of projecting pseudopodia. In some cases they are closely packed together, and a considerable number are found in the bloodvessels. By carefully investigating the different parts of the lung, it will be found that the epithelial infection, although present wherever nests of epithelium are formed, is not uniform, and that certain bronchi and areas of the lung have escaped. By such a comparison we may rule out the possibility of these bodies being due to a peculiarity of the staining method, and a careful comparison of a large number of sections shows that the presence of these bodies in certain localities, especially in the carcinomatous nodule, holds for all the sections made, although the staining method may have been slightly modified. Directly beneath the pleural surface are areas in which the alveoli are filled with blood and the capillaries are markedly engorged. These areas correspond to the small hemorrhages observed macroscopically.

Examination of sections of the spleen shows it to contain a large amount of brown pigment deposited in the pulp. Evidence of widespread hemorrhage is also found, and the follicles are markedly enlarged. (Plate V., Fig. 1.) In sections stained with Plimmer's method the nuclei of a large number of the cells of the follicles contain a deeply stained central body—in some cases spherical, in other cases of irregular shape. These we believe are young parasites. (Plate VI., Fig. 2.)

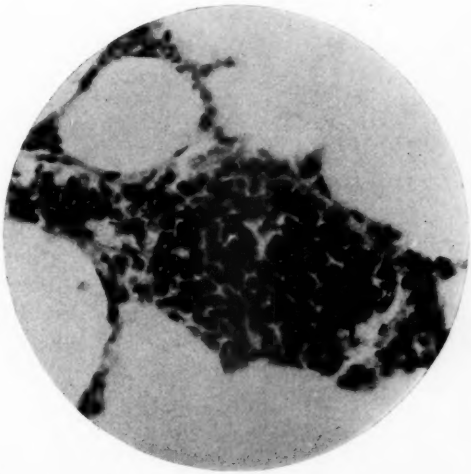
The pigment in the pulp takes the form of triangular and irregularly shaped plates, and is very abundant. The pulp contains a large number of lymphocytes and red blood-corpuscles. Scattered between the cells in the pulp are a large number of extracellular parasitic bodies, which conform in size to the pale forms which in the fresh state are capable of sending out pseudopodia. (Plate V., Fig. 2.) (Plimmer's stain.)

Summary of Case I.: The facts in this case may be summarized as follows: The primary growth was adenocarcinoma, probably having its origin in the appendix. This had spread, involving the greater portion of the peritoneal surface, with infiltration of the omentum and mesentery. The greater portion of the tumor had undergone mucoid degeneration, and the peritoneal cavity was filled with clear, straw-colored fluid. The patient was opened aseptically. A test-tube of this fluid, which was



1.

Margin of smaller nodule, Pig I. (M. P.) (H. E.)

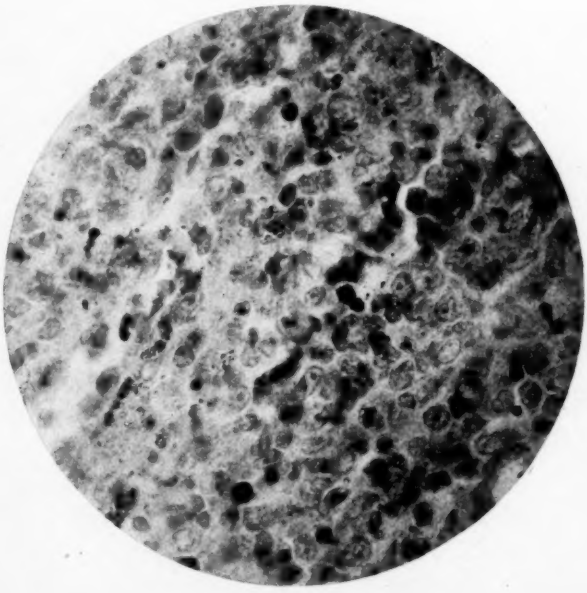


2.

Typical focus of round cells in perivascular lymph space of small vessel.
Lung Pig I. (H. P.) (H. E.)

1.

Section of spleen, Pig I, showing enlarged follicles and hæmatogenous pigment deposited in pulp. (L. P.) (H. E.)



2.

Periphery of follicle of spleen, Pig I, free Russell's bodies (young protozoa) between the cells. (H. P.) (Plimmer's method.)

removed through a sterile tube, and which remained bacteriologically sterile after an incubation period of thirteen days, contained a large number of small hyaline bodies, which were observed under the microscope to increase in size and change their form and pass through a cycle of development to what appeared to be a spore-forming stage, was injected into three animals—two, a dog and a guinea-pig, in the peritoneal cavity; one, a guinea-pig, in the jugular. The guinea-pig and dog which were inoculated in the peritoneal cavity developed no tumor formation, but a marked peritonitis and enlargement of the regional lymph nodes. The abdominal cavities of each animal contained a small amount of fluid; and in this fluid we were able to detect the characteristic spherical bodies, nucleated bodies, and sacs filled with the granules already described as being present in the primary case.

Slides taken from this fluid and incubated for a period of three or four days in the thermostat showed that the bodies not only changed their form, but we were able to trace the development of the larger structures from the small hyaline forms. Of particular interest was a portion of a slide so treated, in which we found numbers of the organisms which had sent out pseudopodia toward a neighboring air-bell. There were at least twenty organisms so arranged, and all of them had run out long pseudopodial projections to the margin of the air-bubble.

The animal injected in the jugular was killed after fifty days. On section the lungs were found to contain minute white nodules, which, on microscopical examination, proved to be beginning foci of adenocarcinoma. The pulmonary bloodvessels showed marked proliferation of the epithelial and adventitial cells. The spleen of the animal contained a large amount of blood-pigment, and the Malpighian corpuscles were enlarged. The cells of the tumor and those of the enlarged follicles in the spleen were each found to contain within the nucleus irregularly-shaped, deeply-stained bodies of unusual appearance. About the periphery of the follicles and scattered through the splenic pulp were a number of round and oval bodies, which corresponded morphologically to what are known as Russell's fuchsin bodies. In the perivascular lymph spaces of the lung we have since been able to detect, by employing Plimmer's staining method, the presence of the half-grown organisms in large numbers, which corresponded to those described by him as of constant occurrence in carcinoma in man.

Our attempts to cultivate these organisms at the time of this experiment were not followed by success, as the forms of culture media employed were unsuitable. As will be seen later, in the experiments which shortly followed upon the one just described we met with better success, and succeeded in cultivating with comparative regularity, directly from cancer, from fluids which were in contact with cancer, and from experimental animals, the organisms which have been

described in this first experiment. The medium which has thus far given us the best results is that recommended by Celli for the cultivation of amœbæ, fucus crispus bouillon.

Two other animals were inoculated at this time—one, a guinea-pig, in the peritoneal cavity, which was killed after nineteen days, and a dog which rapidly became emaciated and died after sixty-four days, presenting marked evidence of peritonitis with general enlargement of the regional lymph nodes, enlargement of the spleen, and œdema of the lungs. In the peritoneal fluid and the heart's blood, as well as from the organs of these animals, we were able to detect large numbers of the parasites. Sections of these organs, which have since been stained with Plimmer's method, reveal the presence of large numbers of the parasites in all of the viscera, however, especially numerous in the lymph nodes and lungs.

A number of tubes of the serum from this first case have been retained in the laboratory, and animals have been inoculated with them at later periods. Of special interest are Guinea-pigs 40, 42, and 43, which were inoculated with this serum which had stood for four months, with no other precautions being taken than placing the tubes which contained it in a cool place. The animals inoculated at this later period gave identically the same results as those of the original experiments.

During the period of these first experiments I was fortunate in having as an assistant Dr. F. C. Busch, who now occupies the chair of physiology in the University of Buffalo. Dr. Busch was of the greatest service to me, and assisted me in all of the work of that period with great skill and devotion.

Following these first experiments our efforts were especially directed toward an investigation of the fresh scrapings of cancers, and in attempting to demonstrate these bodies in the tissue in hardened sections. Having once established the fact that the small spherical bodies which so closely resemble fat were not fat (giving no reaction with osmic acid[1] and not being affected by fat solvents) we set about to determine how the great discrepancy between the large number of parasites found in fresh cancer and in sections could be accounted for.

A careful examination of a large number of tumors, including those removed by operation, shows that in all rapidly growing tumors, espe-

[1] In determining the relation of these bodies to osmic acid, fat was used as a control and placed under the same conditions. In one or two cases, after a treatment of one or two days with osmic acid, the writer has observed a slight browning of the periphery of these bodies, but fat used as a control had long before given the intense black reaction which characterizes it. We are not certain whether or not it is possible to cause a browning or possibly even blackening of these bodies by osmic acid if treated in some special manner. This question will be the subject of a special piece of research in the laboratory, but will in no way affect the significance of our findings. Sections hardened in Hermann's fluid in which the fat in the tissue gives the usual black reaction when cleared in origanum oil and covered with a cover-glass without staining show bodies that are of a yellowish color.

cially when of large size, a great number of organisms are present. Small tumors, as a rule, were found to contain only the smaller forms of the organisms; the tumors and organs removed from cadavers of patients who had died from carcinoma or sarcoma showed the presence, especially in the tumors, of great numbers of the organisms in all phases of development. After comparing tumors removed by operation and those from cadavers it becomes evident that the organisms either increase very rapidly during the period just before death or that they proliferate in the tissues after death. In two cases of large-sized tumors, which immediately after operation contained a predominating number of the small forms of the organism, and which were retained sterile, we were able to make the following observations:

An examination of successive scrapings from the tumor, several hours apart, in each case showed that the relative size of the organisms gradually increased. In the course of ten hours repeated scrapings showed that the amœboid forms were greatly increased in number, and after twenty-four hours the spore sacs of the organism were present, for the first time, in large numbers. Continuing our observation up to a period of about three days, we observed in these two cases that the sacs were ultimately replaced by groups of hyaline bodies, which were considerably larger than those which the sacs originally contained. It will be seen from this observation that the so-called fatty degeneration of carcinoma is at least in some part due to the presence of the various forms of the organism which have been mistaken for fat droplets and infected epithelial cells which were supposed to be in an advanced stage of fatty degeneration.

We were likewise able to determine that in the centre of carcinomata which had undergone degeneration the fluid, the so-called cancer milk of the older writers, consists practically of a pure culture of these organisms. The fluid from malignant ovarian cysts likewise contains a large number of the organisms, and the peculiarly characteristic mush found in the cavities of certain adenocarcinomata of the ovaries is likewise largely composed of the various forms of the parasite.

We were thus forced to conclude that bodies identical in appearance to those observed by us in the peritoneal fluid of our first case could be found in all scrapings of cancer. The small, highly refractive form which in suspension possesses a characteristic oscillating motion, the larger pale forms projecting pseudopodia, and the saccular forms containing highly refractive spherical bodies could be detected with equal facility in the fresh scrapings of any malignant tumor. The small form of the organism which so closely resembles fat, and the larger spherical forms containing fine granules are particularly abundant. By incubating hanging-drop preparations of fresh scrapings from cancer the smaller forms can be followed in their development, during which

they grow in size and finally become granulated, and, if kept upon a warm stage, ultimately throw out pseudopodia, develop a nucleus, and end by turning into a sac containing the spores of the organism. Owing to the fact that the specific gravity of the organism is less than water, it rises to the surface, and must be sought directly beneath the cover-slip and not in the lower portions of the fluid. This fact we had noticed and made use of before the recent publication of Funk on the vaccine organism.

Having ascertained that a large number of organisms were invariably present in cancer, we undertook to determine why these organisms could not be demonstrated with the ordinary staining methods in the tissues, and were able, first of all, to determine that the application of almost all fixatives caused the disappearance of all the spore sacs of the organisms, and the greater part of the large spherical and granular bodies. Only the small, more resistant forms of the organism remained, and these we were able to stain in a large number of sections with the aniline dyes, in which case they presented the form which has already been recognized and first described by Russell, known as "Russell's fuchsin bodies." The larger forms which are still hyaline in character or contain fine granules, and which might be spoken of as the quarter-grown organism, in sections stained by the ordinary methods so closely resembled free nuclei and round cells that it was impossible to state which were parasites and which tissue elements. In one case, however, of carcinoma of the bladder, observed during this period, where the organism appeared in large numbers in the urine, we were able to detect, even in hæmatoxylin preparations, the quarter-grown form of the parasite between the epithelial cells, and attached to the surface of the tumor after removal.

In the summer of 1898 the writer was asked to make an autopsy on a female patient who had died of carcinoma of the uterus. On opening the peritoneal cavity we were surprised to find an advanced general peritonitis. There was considerable clear fluid in the peritoneal cavity, and the surface of the peritoneum had lost its brilliancy. The intestines were matted together, and the thought was immediately awakened that a perforation of the vagina had probably occurred as the cancer involved the cervix, and that bacteria had entered the peritoneal cavity and had thus produced a secondary infection. On examining the spleen it was found that nearly one-half of that organ was in a condition of infarction; and on examining the lungs they were found to be markedly œdematous. Cultures for bacteria were made from the peritoneal cavity, the spleen, the blood, and the lungs, with the result which was determined later that they all remained bacteriologically sterile.

On returning to an investigation of the pelvic organs, we were immediately struck with the fact that there was no perforation, which at once directed our attention to the possibility that the case might be one

of general infection with the organism of cancer. For this reason we immediately made fresh preparations from the surface of the peritoneum, the substance of the spleen, the lungs, the heart's blood, and one of the larger superficial veins of the lower extremity. In all of these were found large numbers of the pale hyaline forms which we had already learned to recognize as constant in scrapings from carcinoma, in the peritoneal fluid of carcinomatous patients, and in the heart's blood and peritoneal fluid of our experimental animals. Dr. Irving Phillips Lyon, associated with the laboratory, was present with me at the autopsy, and confirmed my observations.

This was the status of our work in December, 1898, and it was upon the basis of these facts that the writer made the statement before the Medical Society of the State of New York, in January, 1899, which was quoted at the beginning of this paper. It will be seen from this statement that we believed we had recognized and demonstrated the presence of parasites in cancer and had successfully produced cancer in one animal, but that we were not at that time in a position to state what the nature of these parasites might be.

During the winter of 1898–99 the writer planned an elaborate series of experiments, based upon our original experiment, which are only just completed. With the clew afforded by the findings of the autopsy described above we have examined since that time the organs of a number of cadavers which have died from cancer, and on the bases of these observations we are prepared to state that *all the organs, including the blood taken from all regions of all cases dying of cancer, including sarcoma and epithelioma, contain large numbers of the organisms.*

Following the same lines, we have likewise observed *in all cases of carcinoma and sarcoma thus far examined in which cachexia was well marked, that the organisms, especially the younger forms, can be detected in the peripheral blood.* In these cases the smaller forms of the organism possess the peculiar oscillating motion already described. The quarter-grown forms of the organism are usually actively sending out pseudopodia, and conform very closely in appearance to the amœboid bodies found in the blood by Pfeiffer and Reed after vaccination and in cases of smallpox. (The question of the time of appearance of these organisms and the utilization of this fact as a means of diagnosis already forms the subject of a piece of research in the laboratory.) Animals may be infected by inoculating them with the peripheral blood from cachectic cancer cases when the serum contains the organism. In these cases the organism possesses great virulence. The younger forms of the organism may likewise be found in the peripheral blood of the animals after inoculation with cultures or carcinomatous material. Figs. 2 and 3, Plate VI., represent the larger hyaline forms of the organism from the blood of a case of fatal malignant lymphoma obtained seven days before death.

Having reported before the State Society our findings of parasites in cancer, it remained for us to determine the nature of these organisms and to continue our investigation in the most comprehensive manner possible. It became at once apparent that there could be but two possibilities in the case—either that the organisms were of an animal nature, and were then protozoa, or that they belonged in the vegetable kingdom, in which case they were in all probability low forms of fungi, probably yeasts. In order to understand the difficulties which prevented our arriving at an earlier conclusion as to the nature of these parasites it is well to review the status of scientific research at that time.

When, in 1898, the State of New York established a laboratory for the investigation of cancer, the attention of the scientific world was attracted by a series of five articles published by an Italian investigator, Sanfelice, of Cagliari, Sardinia, all of which appeared in the *Zeitschrift für Hygiene und Infectionskrankheiten*. Beside these, a number of articles appeared in different periodicals by a second Italian investigator, Roncali. These last are of less importance. The purport of the articles of both of these investigators was that the parasitic inclusions found in cancer were identical in appearance with yeast organisms or blastomycetes when injected into the tissues of animals. Sanfelice's articles went further, and in the twenty-ninth volume, 1898, of the above-mentioned journal, he published an account of tumors which he succeeded in producing by inoculation with a yeast in two dogs, both of which he wishes to designate as true adenocarcinoma forming metastases.

Before entering into a discussion of the merits of Sanfelice's investigations it is well to state that the first observer to interpret the spherical, hyaline bodies found in cancer as blastomycetes was Russell. Russell published an article in the *British Medical Journal*,[1] in 1890, in which he claimed that he had detected a micro-organism to which he gave the non-committal name of "fuchsin body." These were found in groups or clusters of from two or three to twenty or more. They were from four to twelve μ in diameter, were apparently homogeneous, and in some cases the groups of bodies were held together by a faintly stained material. He believed they belonged in the yeast group (Sprosspilze). Russell made no attempts to cultivate these organisms. His publication

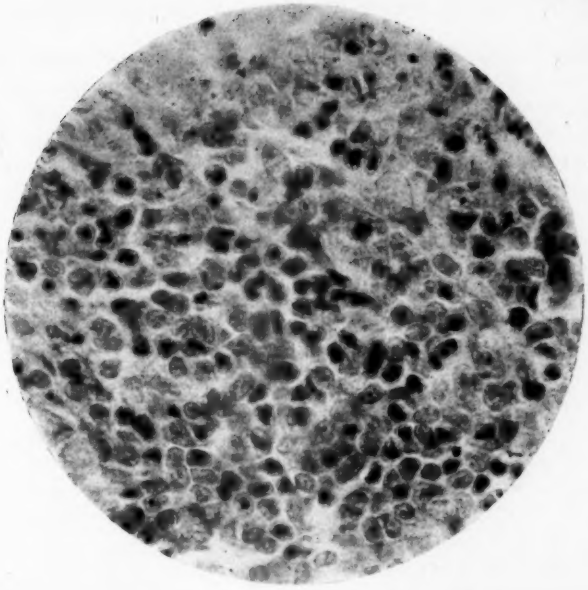
LEGEND OF PLATE VI.

Fig. 1. Centre of follicle of spleen, Fig 1. A large number of cells contain deeply stained bodies within the nuclei (internuclear infection).

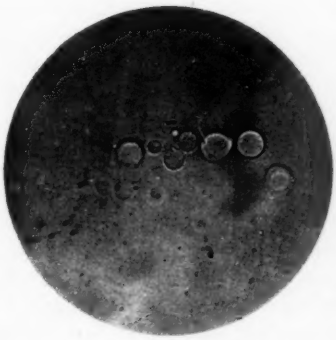
Figs. 2 and 3. Young forms of parasite from blood of case of malignant lymphoma. (Oil immersion, fresh preparation.)

Fig. 4. Very small and quarter-grown form of parasite from case of carcinoma of pylorus involving omentum. Culture obtained from fragment of metastatic deposit on fucus crispus bouillon. (Oil immersion, fresh preparation.)

[1] An address on a Characteristic Organism of Cancer, December 13, 1890, vol. ii., p. 1356.



1.



2.

3

4.

led to very heated discussion, and his work was attacked, especially by Shattuck and Ballance, *British Medical Journal*, 1890, vol. i., p. 565, and Klein, *Beiträge zur pathologischen Anatomie und zur allgemeinen Pathologie*, 1891, Bd. xi. The first of these authors described similar bodies found in caseating lymph nodes and the walls of senile arteries, while Klein was of the opinion that Russell's bodies bore a close relation to Altmann's cell granulæ.

In 1895 Busse, a German investigator, published the first description of an undoubted yeast, which he found to be the cause of a fatal infection in man. This organism he succeeded in isolating in pure culture, and found that the lesions which it produced were a combination of abscess and tumor formation ("Ueber Saccharomycosis Hominis," *Virchow's Archiv*, vol. cxl., p. 23). The appearance of the organisms in the tissue was so suggestive of the cell inclusions in carcinoma that Busse had previously published a description of the case under the title "On Parasitic Cell Inclusions and their Cultivation," in the *Centralblatt für Bacteriologie*, vol. xvi. The organisms were very commonly within the large cells which composed the walls of the abscess cavities, and under these conditions presented an appearance very much like the cell inclusions of carcinoma. In 1897 Busse published a monograph entitled *The Yeast Organism as the Cause of Disease*. In his last publication he is distinctly of the opinion that the pathogenic yeasts and the cell inclusions in cancer have no relation to each other. He describes a series of experiments which he carried out in the hope of causing proliferation of the cell inclusions of cancer. For this purpose he planted small portions of tumor in which he had detected the inclusions in various kinds of culture media, and placed them for several days in a thermostat. In none of these experiments was he able either to obtain a culture of organisms or to observe that the cell inclusion showed any evidence of increase in number or change of form. He likewise attempted to inoculate animals with small portions of lymphosarcoma, with negative results. He included a short description of all of the organisms of the same class described up to the time of his publication, and because of the negative results obtained and the fact that no positive evidence had been produced to show the identity of cell inclusions and yeast organisms, he concluded that they had nothing to do with each other, and that the yeast organism played no rôle in the production of carcinoma. Beside Busse, a number of observers have since described lesions of various kinds (especially skin lesions) produced by yeasts.[1]

The articles of Sanfelice are of the greatest interest, as he has undertaken to elucidate the subject by a careful study of wild yeasts and

[1] Gilchrist: Johns Hopkins Hospital Reports, vol. i. Gilchrist and Stokes: Journal of Experimental Medicine, 1898. L. Hektoen: Ibid., vol. iv., p. 261.

such as he found to possess pathogenic properties for animals. Among these was one obtained by cultivation from the skin of a lemon, which, when injected into animals, produced granulomata. These, in his opinion, closely resembled sarcoma, for which reason he gave the organism the name "saccharomyces neoformans." In 1898 Sanfelice published an account in which he stated that in his experiments he had inoculated, up to 1896, fifty-nine dogs. His method of inoculation he had varied as much as possible—some in the subcutaneous connective tissue, others in the testes, others in the breast, the spleen, the liver, the lungs, the jugular vein, and the peritoneum. Most of the animals showed no pathological change and were killed after three, four, and five months. In the greater number of these animals Sanfelice was unable to cultivate the organisms from the region of the inoculation, but in most cases he was able to secure them from the regional lymph nodes. By transferring his organism from dog to dog he succeeded in increasing its virulence to such an extent that, while in the beginning when injected into the jugular vein it produced no lesions, in the end similar inoculations resulted in the death of the animal, with the development of characteristic changes in various organs. Beside simple inoculations, he practised various methods to reduce the resistance of the animals, such as drawing a portion of their blood, injuring the tissues before inoculation, and introducing foreign bodies at the time of the inoculation. None of these devices produced any further results than those obtained by the simple inoculation. He ultimately succeeded in obtaining what he described as a positive result by inoculating a female dog with a culture of saccharomyces neoformans which had passed through a large number of dogs. A small portion of the culture was removed with a platinum needle, emulsified with sterile water, and injected into the breast with an ordinary sterile syringe. After the first few days the breast showed a certain amount of swelling and inflammatory reaction. *This disappeared after a few days and the breast presented a normal appearance.* After several months he observed that the breast in the neighborhood of the inoculation began to swell, and this increased gradually until a definite tumor was formed, which at the time of the death of the dog, ten months later, was about half the size of an egg. With the development of the tumor the dog showed definite signs of emaciation. The tumor was of greater consistence than the breast, and the nipple was retracted. The skin in one or two places was apparently adherent to the tumor. The inguinal lymph nodes on both sides were somewhat enlarged, the largest about the size of an almond, the smallest the size of a hazel-nut. The organs of the thorax and head showed no pathological changes.

Microscopical sections made through the tumor showed that the centre of the structure did not possess the same histological character-

istics as the periphery. At the centre the tumor presented the appearance of the normal breast of the dog. At the periphery the histological characteristics of the tumor were such, to judge from the description of the author, as to strongly suggest malignant change. Instead of the single layer of epithelium lining the spaces in the connective tissue stroma, which characterized the centre of the tumor, the portions near the periphery were lined by multiple layers of large epithelial cells. The nuclei were irregularly arranged, of varying size and form, and the membrana propria of the canals was missing. Isolated nests of epithelium were likewise to be found in the stroma. The epithelium exceeded in amount the connective tissue stroma. Sanfelice found that the enlarged lymph nodes on section presented the appearance of containing metastatic deposits of the large tumor. Sections cut from these lymph nodes showed that they actually contained epithelial structures of similar form and appearance to the peripheral portions of the tumor.

From the description of the tumor given, indicating the development of metastases in the regional lymph nodes, if the description of the author can be taken, there is little reason to suppose that the case was not one of true adenocarcinoma. *From the original tumor and all of the lymph nodes, Sanfelice was unable to obtain cultures of his organism, and neither in the metastatic deposits nor in the primary tumor was he able to demonstrate bodies which were unquestionably yeasts.*

Beside the case just mentioned, Sanfelice describes a second dog, which was inoculated in the testicles, and which, after a period of four months, had developed a well-defined enlargement of the organ and several nodular masses, which appeared to be enlarged regional nodes. Several nodular masses were found within the prepuce of the animal, and Sanfelice observed that from the orifice a small amount of purulent fluid could be expressed, in the cells of which he detected inclusions closely resembling the bodies of Russell, which he considered to be altered yeasts.

The animal died unexpectedly during the sixth month, and at the autopsy, which was performed with the assistance of Prof. Charbone (pathologist), the nodular enlargement of the testicle was found to be of yellowish-white appearance, of definite consistence, which could not be sharply differentiated from the tissue of the testicle. On both sides of the penis bone were a large number of apparently metastatic deposits —one of these as large as a hazel-nut, the majority about the size of peas. Surrounding the glands was a conical mass of newly-formed tissue, which communicated with the preputial opening. The primary tumor appeared to be in the testicle, and the smaller deposits appeared to be of a metastatic nature. The inguinal lymph nodes were slightly enlarged, and on section presented a normal appearance. The spleen,

kidneys, and liver were slightly hyperæmic, but showed no other changes.

As the autopsy revealed no well-defined cause for the exodus, the decision was reached that the animal had been surreptitiously poisoned. Cultures which were made by emulsifying portions of the tumor and metastases were all negative. Portions of the tumor were used to inoculate other animals. At the time of the publication Sanfelice was not in a position to state the outcome of these experiments. Sections of the tumor showed it to be very probably of epithelial nature. The cells of the tumor were rather small, and closely resembled those of the basal cells of the seminal vesicles of the dog.

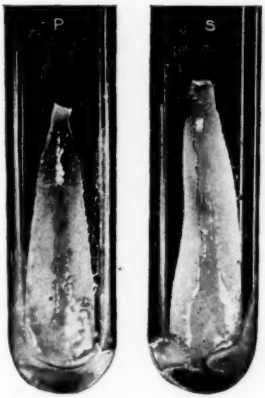
In 1898 the writer had the pleasure of making Prof. Sanfelice's acquaintance and carefully going over with him the sections from these two cases and obtaining from him a culture of the saccharomyces neoformans and blocks of tissue from the two tumors. It is important in estimating the work of an observer to know something of his character and temperament, and for that reason it was a great pleasure to make Prof. Sanfelice's acquaintance. He is a man of unquestionable sincerity and honor, and no matter what the interpretation of the work which he has published may be, his statements can be accepted as accurate so far as observation can make them. There is absolutely no question that the tumor of the breast with metastases in the regional lymph nodes, described by Sanfelice, would pass muster as an adenocarcinoma.[1]

The courtesy which Prof. Sanfelice showed me in placing before me and at my disposal all of his material has been of the greatest service to the laboratory, and I wish to take this occasion to publicly thank him for his courtesies. The culture which he forwarded to us was that of an ordinary yeast, so far as we are able to classify it. The appearance of the culture and of the fresh organism is shown in Plate VII., Figs. 1 and 2.

The publications of Roncali have been confined to the description of attempts to cultivate yeasts from carcinomata. He describes several successful attempts in which he employed acid sugar-water as the medium. The writer was not deeply impressed with the preparations which Prof. Roncali showed him, and, as his cultivation experiments are so widely at variance with those of other observers and ourselves, we feel that they do not require a detailed description.

In the April number of the *Practitioner* for 1899 there appeared an article by Plimmer which is without doubt the most important communication in a number of that journal devoted entirely to the subject of cancer. After a short review of the literature, and an analytical discussion

[1] The probable significance of these experiments will be considered in Part II. of this article.

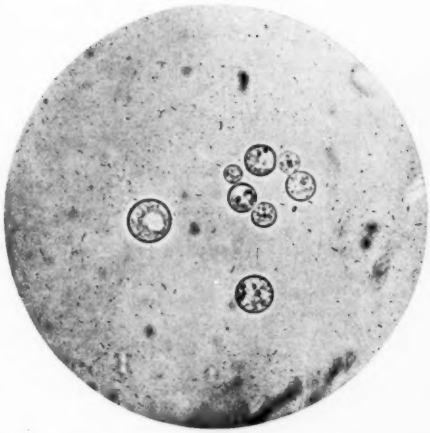


1.

Potato cultures of Plimmer's yeast and Sanfelice's "Saccharomyces Neoformans."

2.

Fresh preparation of "Saccharomyces Neoformans," Sanfelice. (Oil immersion.)



3.

Fresh preparation of Plimmer's yeast. (Oil immersion.)

of the structure of cancer, Plimmer gives the method by which he has examined a large number of cancers of various types. He recommends various hardening and staining methods for the demonstration of cellular inclusions, and, as in our experience one of these methods gives pre-eminent results, it would seem desirable to introduce it at this point:

1. Small slices of tissue are hardened in Hermann's fluid twelve to twenty-four hours.
2. Thorough washing in running water, twelve to twenty-four hours.
3. Harden in alcohol; embed in paraffin.
4. Remove paraffin in xylol.
5. Absolute alcohol.
6. Place in peroxide of hydrogen until the black is removed from the section and no further bubbles form upon the surface, one-quarter to half an hour.
7. Wash in water.
8. Stain with Haidenhain's iron hæmatoxylin or Mallory's simple iron hæmatoxylin.
9. Thorough washing in running water three to six hours.
10. Stain in 1 per cent. Ehrlich's neutral red or Bordeaux red. (This solution must be kept neutral. When it becomes acid it must be neutralized with alkali.) After staining with iron hæmatoxylin the differentiation must be continued until the protoplasm is colorless. The amount of red in the preparation must be controlled under the microscope.

Parasitic bodies in cancer and yeast organisms in the tissue are stained yellowish-red to coppery-red; nuclei, blue-black; connective tissue structures, brilliant red. Plimmer's description of the bodies is as follows:

"The parasites, as they most often occur, are round bodies of very diverse sizes, from 0.004 mm. to 0.04 mm. or even more in diameter. There is a central portion which I shall call here for convenience the nucleus, although there is nothing in this central portion in common with the biological nucleus, which is generally round, but which may be irregular in shape; around the nucleus is a layer of protoplasm, and outside of this is a capsule. This nucleus differs in its microchemical reactions from the nucleus of the cell; it takes, with the Ehrlich-Biondi solution, a copper-red color; with thionin, a dark purple; and with (1) of the double hæmatoxylin stains, described on page 440, it also takes a copper-red color, quite different from the red of either the protoplasm or the fibrous stroma; and with (2) it takes a dark claret color, again darker than that of the protoplasm or stroma. With the Ehrlich-Biondi stain it reacts somewhat like the nucleolus of the cancer-cell nucleus, but the color of the latter is much brighter; moreover, with many other stains—such as aniline-blue or *bleu de Lyon*, aniline-

green—it does not, as does the nucleolus, lose the stain when washed with spirit, but retains it even after immersion. This is to be remembered against the assertion that these bodies are aberrant nuclear structures. In very perfectly fixed specimens a lighter spot can be observed in the nucleus, which is not visible in fresh specimens; but in fresh specimens the nucleus appears to be larger than in fixed ones. It is to be noted that the nucleus is practically refractory to hæmatoxylin used in the strongest manner possible, when this is done by the ordinary methods. This, again, is very important in connection with the statement that the bodies are nuclear structures.

"The layer of protoplasm around the nucleus is generally homogeneous, and stains much less deeply than the nucleus. With alcohol fixation, again, the phenomenon of metachromatism is sometimes seen, the protoplasm staining blue with the Ehrlich-Biondi mixture. When the parasite has attained a certain size a rayed appearance is often seen in the protoplasm, but I have never seen this in the fresh state, and think it may be due to the fixative.

"The capsule is a very well-marked structure, which can be seen well both in the fresh as well as in fixed specimens. That this capsule is a part of the parasite can be demonstrated by the fact that it can sometimes be seen folded over on itself, and sometimes from fixation it shrinks away from the protoplasm of the cell, and also the parasite can sometimes be seen free in an alveolus with its capsule around it. It stains more definitely than either the nucleus or protoplasm; with the Ehrlich-Biondi mixture it is a brighter red than either of the other structures; with thionin it is darker; with hæmatoxylin, acid fuchsin, and orange it is a clear, bright red, and with hæmatoxylin and Bordeaux red it shows best as a very bright red line.

"This description applies to the forms most commonly met with, but there are some other forms which are met with, especially in cancers of rapid growth; they are, however, rare, so I will merely tabulate them:

"1. The form described above, in which the nucleus has attached to it a small body with similar reactions—*i. e.*, reproduction by budding.

"2. A very small form, consisting of a capsule with a small central dot, staining similarly to the nucleus of the larger forms.

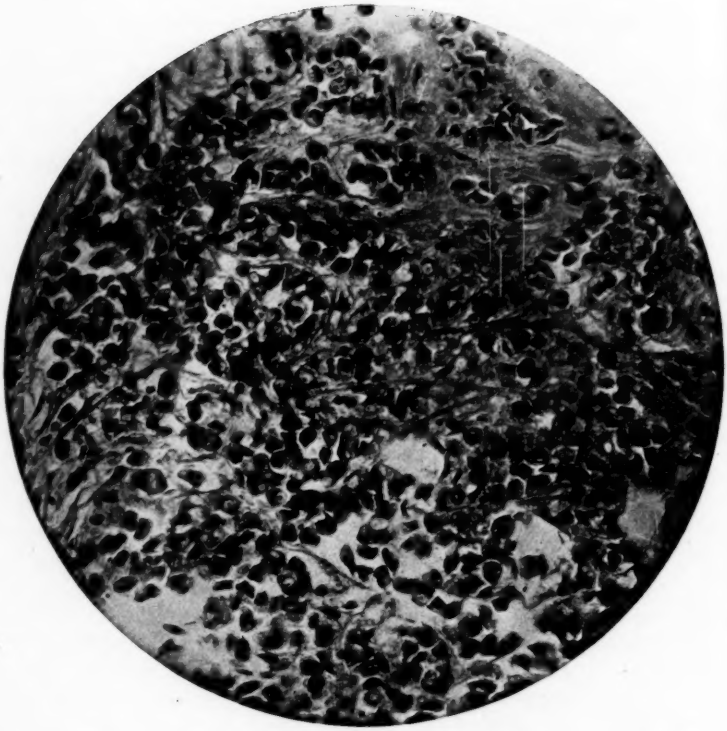
"3. A larger form, consisting of a capsule in which are two large dots in one diameter, and two smaller dots in another diameter at right angles to the first.

"4. A larger form again, consisting of a fine capsule, in which are a number of fine dots, not arranged systematically.

"5. A still larger form, consisting of a well-marked capsule, in which is a central nucleus with generally six smaller dots arranged around it."

Plimmer states that during a period of six years he has examined microscopically 1278 cancers. These did not include any cases of sar-

PLATE VIII.



Section of rapidly growing carcinoma of breast. (Original preparation from Plimmer stained with Plimmer's method.) Nearly every cell contains a Plimmer body (inter-cellular protozoa). (Low Power.)

coma. In 1130 of these cases he found parasitic bodies which come under the heading of those just described by him. His list included cancer of the breast, skin, including tongue and penis, uterus and vagina, stomach and intestines, liver, pancreas, lung, bladder, and glands. The parasites were not found in all portions of the cancer, but were usually present at the growing edge, and in the degenerated portions of the growths they were absent. They appear only in the bodies of active cells, and not in those which show retrograde or degenerative changes. They may be found free lying between the cells and having the same reactions as those which are included within the cell protoplasm. They may also be found in leucocytes. They did not appear in anything like equal numbers in all cases. Generally speaking, in most cancers they were comparatively few in number, but in some very rapidly growing cancers they could be found in enormous numbers, as in the case which he illustrates. He states that in his entire list he has only nine in which there were a large number of parasites; but in these cases there was scarcely a cell which did not contain one or more or even as many as sixty parasites. He states that he has likewise examined a large number of other pathological conditions with a view of determining whether similar bodies could be found. These structures included gummata, histoid tumors of all kinds, tubercular growths, glanders, actinomycotic growths and tissues which had been irritated, as well as normal tissues, and concludes by stating: "I have never in man, in any instance, seen any intracellular or extracellular bodies which were like the parasitic bodies described above, or which had their reactions."

The sixth portion of Plimmer's article is devoted to a description of attempts to cultivate the parasitic inclusions which he describes, and states that in the last case which he has investigated, and which contains a large number of parasitic bodies, he was able to isolate the organism which, in certain animals, was capable of causing death by the production of tumors in various parts. The primary growth was a carcinoma of the breast taken from a woman, aged thirty-five years. It had a history of only two months' duration, and was growing rapidly at the time of operation. Prof. Plimmer has been kind enough to present me a section from this case, a photograph of which is shown on Plate VIII. In cultivating the organism he employed a medium, the basis of which was an infusion of cancer prepared according to the formula employed for ordinary bouillon, and to this was added, after careful neutralization, 2 per cent. of glucose and 1 per cent. of tartaric acid. Into this were introduced small pieces of the growth, cut with all possible precaution against contamination, and the inoculated tubes were placed under anaërobic conditions. After three to five days in three of the flasks inoculated he found a culture of an

organism which undoubtedly belongs in the yeast group. We are again indebted to Prof. Plimmer for a culture of this organism. When grown upon ordinary culture media it is that of an ordinary yeast (see Plate VII., Fig. 1). Its histological characteristics are shown in Plate VII., Fig. 3.

I wish to thank Prof. Plimmer for the courtesy which he has constantly shown our institution, both by communicating to us the result of his more recent work and by supplying us with sections and cultures.

Beside Plimmer, several observers claim to have been successful in the cultivation of yeast organisms from cancer. Kahane obtained a culture of blastomycetes from a cancer of the uterus; Mafucci and Sirleo have obtained cultures from malignant tumors, but their results were mostly negative; Corselli and Frisco report a case of sarcoma of the mesenteric glands, from which they isolated a blastomyces. They obtained the organism during the life of the patient, and after death from the fluid in the abdominal and thoracic cavities. This is apparently a case of true yeast infection. Curtis has reported a case of myxomatous tumor in man, from which he obtained a culture of a blastomyces, which after inoculation produced a similar tumor in a rabbit. Sawtschenko, who published an article in the *Bibliotheca Medica*, 1895, on "Sporozoa in Tumors," states that on a further consideration of his specimens he is now inclined to believe that they are altered yeast organisms. Anna Steckson, in an article on "The Blastomyces of Curtis and its Relation to the Etiology of Tumors," Stockholm, 1900, states that she has cultivated blastomycetes from five cases of carcinoma. The organisms grew on all the ordinary forms of culture media.

In reviewing Plimmer's work the following points present themselves:

1. Can the bodies differentiated by Plimmer's methods and found by him in a large number of cancers be demonstrated in all cases of carcinoma?

2. Is their morphology constant and do they present characteristics by which they can be invariably recognized?

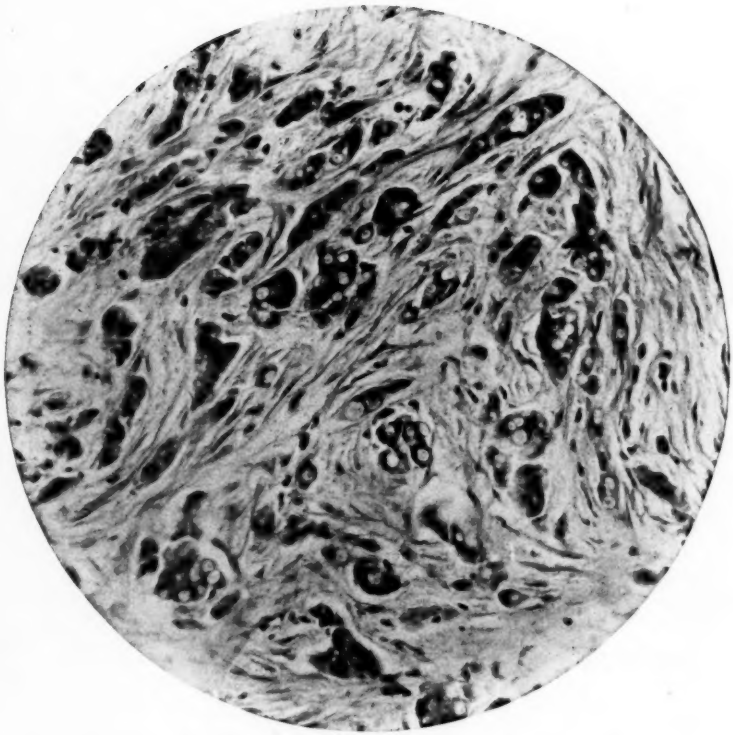
3. Can they be explained as changes in the protoplasm due to degeneration or other causes?

4. Are there morphological and biological grounds for believing that they are altered blastomycetes?

5. Do they bear any relation to the parasites described by other authors—*i. e.*, Russell's bodies and the various cell inclusions interpreted as protozoa?

To determine whether Plimmer's bodies are constant in all malignant tumors a systematic investigation was undertaken immediately after the publication of Plimmer's article. The writer obtained from Prof.

PLATE IX.



Section of rapidly growing carcinoma of breast. (Case 113, Buffalo.) The magnification is the same as Plate VIII. Nearly every cell contains a parasite. Many cells contain more than one.

Plimmer sections from the case he had published, in which the organisms were stained, which were used for comparison, and a detailed account of his staining method was obtained in person. It will be noted in referring to Prof. Plimmer's article that he failed to mention in the description of his method for the demonstration of the bodies the peroxide treatment of the sections which is step six of the method. This is an extremely important point, and may have led to negative results with those who have adhered strictly to the method as published in the *Practitioner*. We do not know how Plimmer came to overlook this step in his publication, or how important he regarded it, but in our experience it seems to be distinctly fundamental, as the tissues do not take either the iron hæmatoxylin or the red satisfactorily when it is omitted.

During the past two years a large number of tumors, both malignant and non-malignant, as well as tissues not related to tumors, have been hardened and stained according to Plimmer's methods, and a large number of sections from each case have been carefully scrutinized. *The results of our observations completely substantiate Plimmer's claim that these bodies are present in all carcinomata.*

In tabulating the results we have used the terms "present" and "absent," and under "present" have classified the number of bodies encountered as "few" and "occasional." Under "few" is meant only one or two organisms to a section, or less than one organism to a section. "Occasional" means eight or ten or more to a section. The results of our investigation in this direction are shown by the accompanying table:

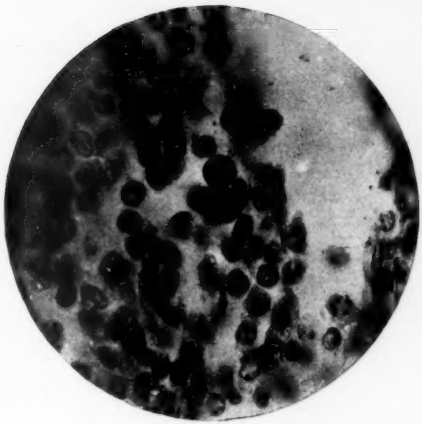
TYPICAL PLIMMER'S BODIES, INTERNUCLEAR PROTOZOAN FORMS, AND RUSSELL'S BODIES.

	Present.		
	Few.	Occasional.	Absent.
Soft carcinoma of breast, primary, skin unbroken	8	5	...
Adenocarcinoma of breast, primary, skin unbroken	1	...	...
Soft carcinoma of breast, with metastases in axillary lymph nodes	2	1	...
Recurrent soft carcinoma of breast	...	2	...
Ulcerating scirrhous carcinoma of breast	1	...	...
Large fungating carcinoma of breast	...	1	...
Rapidly growing primary soft carcinoma of breast contained Plimmer's bodies in great number; nearly every cell contained one or more well-defined bodies except in the central degenerated portions of the tumor. See Plate IX.	...	1	...
Scirrhous carcinoma of the breast, material from which was not fresh	...	...	1

	Present.		
	Few.	Occasional.	Absent.
Carcinoma of stomach	...	1	...
" " " metastases in liver	1	...	...
" " " " in mesenteric lymph nodes	...	1	...
" " pylorus	1	...	...
" " " metastases in mesenteric and omental lymph nodes	...	1	...
Adenocarcinoma of rectum with metastases	...	1	...
" " of colon	1	...	...
" " of appendix, with mucoid involvement of peritoneum; in undegenerated portions of tumor	1	...	...
Mucoid carcinoma of cæcum, involving peritoneum, in undegenerated portions of tumor	1	...	...
Adenocarcinoma of cæcum	1	...	...
Carcinoma of gall-bladder	2	...	...
Secondary carcinoma of liver, ox, only organ examined	1	...	...
Carcinoma of omentum	1	...	...
Adenocarcinoma of uterus	1	...	...
Solid soft carcinoma of uterus	...	1	...
Adenocarcinoma of ovary	2	1	...
" " " protozoan forms in large numbers. (See Plates XI. and XII.)	1	...	...
Case of general carcinosis involving liver, lung, heart, and kidneys, a very acute case	1	...	...
Primary adenocarcinoma of kidney, pig	1	...	.
Hypernephroma from man	2	...	...

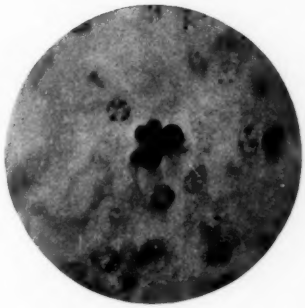
RUSSELL'S BODIES, MODIFIED PLIMMER'S BODIES, PROTOZOAN FORMS.

	Present.		
	Few.	Occasional.	Absent.
Squamous epithelioma of skin	...	1	...
" " " cheek	...	3	...
" " " lip	...	3	...
" " " tongue	...	2	.
" " " penis	...	1	...
" " " cervix	...	2	...
" " " vagina	...	1	...
Squamous epithelioma of orbit, cow; a few atypical bodies giving the reaction of Plimmer bodies, but much larger. (See Plate XIII., Fig. 1)	1	..	...
Multiple sarcoma of skin	1	...	...
Melanosarcoma of skin	3	...	...
Large spindle-celled sarcoma	1	...	...
Spindle-celled sarcoma, metastases in myocardium, horse	1	...	...
Sarcoma of kidney, rooster	1	...	...
Recurrent sarcoma of thigh	1	...	...
Sarcoma of breast involving thoracic wall, dog	1	...	...
Angiosarcoma of brain	1	...	...



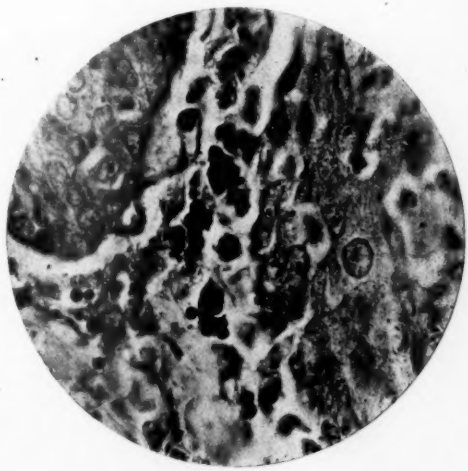
1.

Russell's bodies from carcinomatous lymph node.
(Oil immersion.)
(Plimmer's method.)



2.

Russell's bodies from enlarged regional lymph node. (Carcinoma of breast.) (This node was used to inoculate Dog 18.)
(Oil immersion.)
(Plimmer's method.)

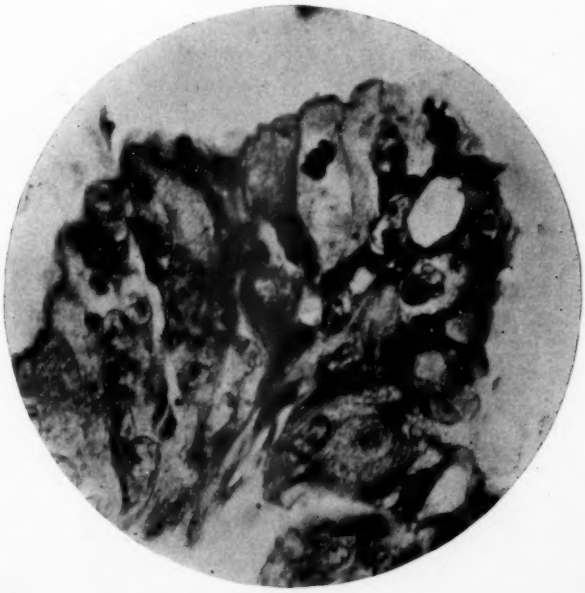


3.

Groups of Russell's bodies from margin of an epithelioma of skin.
(Oil immersion.)
(Methylene blue.)

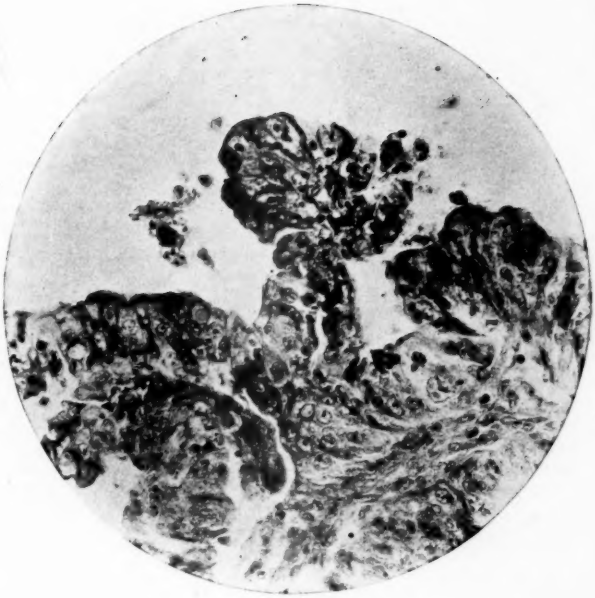
1.

Adeno carcinoma of ovary. Localization of young parasites (Russell's bodies) in the apices of the papillæ. (Plimmer's method.) (M. P.)



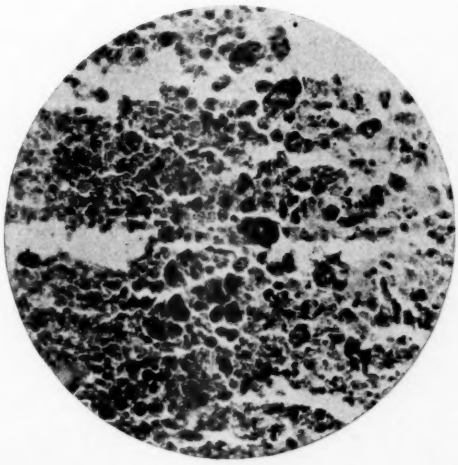
2.

Parasites with pseudopods extended. Same tumor. (Oil immersion.)



1.

Adenocarcinoma of ovary with inter-cellular parasites. (M. P.) (Plimmer's method.)



2.

Free parasites in cystic cavity of tumor. (M. P.) (Plimmer's method.)

	Present		
	Few.	Occasional.	Absent.
Round-celled sarcoma of ilium	1	...	...
Malignant lymphoma	1	...	...
Slowly developing lymphoma	1	...	...
Myxoma of breast	1	...	...
" from pylorus of tiger shark (Galeocerdo tigrinus)	1	...	...
Osteosarcoma	1	...	...
" " of jaw, horse	1	...	...
Adenofibroma of breast, rapidly growing, both breasts involved (see text)	1	...	...
Lipoma of abdominal wall	...	...	1
Fibroma from side of sucker (Chasmistes)	...	...	1
" of musculospiral nerve	...	...	1
Colloid struma	...	2	...
Tuberculosis of breast	...	...	1
Chronic cystic mastitis	...	...	1
Syphilitic lymph nodes[1]	...	1	...

In examining the above table it will be seen that in all cases of carcinoma investigated by this method, with the exception of one which was not fresh, Plimmer's bodies were uniformly present. Likewise in all of these tumors Russell's bodies were numerous, especially about the periphery of the tumors and *in the adjacent lymph nodes, even when these contained no epithelial deposits* Such groups of Russell's bodies are shown on Plate X. One tumor, an adenocarcinoma of the ovary, beside containing typical Plimmer's bodies, contains a large number of cellular inclusions resembling Russell's bodies, and many larger forms which show evidence of previous amœboid movement. These are the so-called protozoan forms of the earlier writers. It will be noted on Plate XI., Figs. 1 and 2, and Plate XII., Fig. 1, that these organisms have infected the epithelium at various points, and as a result of the infection a proliferation has occurred which has thrown the epithelium into folds giving the characteristic papillary appearance of such tumors. As a result it is to be noted that the parasites are present in greatest number at the apices of the papillary projections. The fluid in the cavity of this tumor appears to be nearly a pure culture of organisms (Plate XII., Fig. 2). This tumor was hardened immediately after the operation in sublimate, and was brought by the writer from Dresden, where it was obtained over three years ago. One of the cases in which Plimmer's bodies were found was a rapidly growing adenofibroma of the breast. *This case presented no histological evidence of malignancy, but occasional Plimmer's bodies were found lying in the stroma and between the cells of the acini, as well as a few in cells. The patient developed a similar growth in the remaining breast,*

[1] The organisms found in syphilis closely resemble those of sarcoma. This phase of the question will be reported upon later.

which was likewise operated upon after it had reached a large size, and it likewise contained a few Plimmer's bodies.

Beside these cases of carcinoma fourteen cases of squamous epithelioma were examined, and all of these contained *atypical bodies which gave the staining reactions of Plimmer's bodies, but were much larger and did not contain the characteristic central bodies.* The appearance of the cell inclusions from one of these cases is shown in Plate XIII., Fig. 1. The remainder of the list contains fifteen cases of sarcoma—eleven from man and four from animals—*all of which contained the small forms of the organism within the nuclei. Plimmer's bodies are rare, and not so well defined as in carcinoma.*

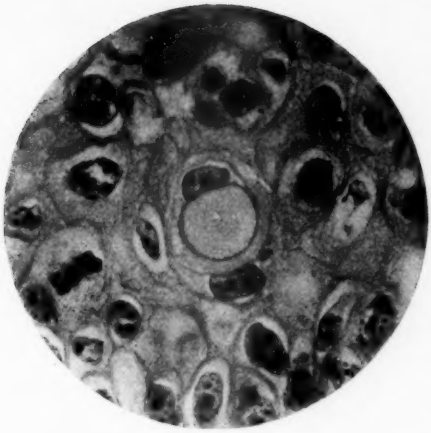
In comparing our findings with those of Plimmer, it will be seen that the results obtained by us completely substantiate his claim that typical bodies of the nature which he has described are of practically constant occurrence in carcinoma and sarcoma. Our list is not nearly so large as Plimmer's, as we have devoted our principal efforts to the experimental side of the problem, and simply wished to confirm or disprove Plimmer's results. We have not considered it necessary to examine a greater number of tumors than those employed for experimental purposes. Beside the tumors enumerated in this list we have examined a large number that were fresh, and have been able invariably to demonstrate the parasites in the fresh condition.

The recognition of the nature of these bodies and the demonstration of their presence in 88 per cent. of 1278 cases is a feat so colossal that it places beyond any question of doubt the significance of these bodies in the cancerous process. Not only should the credit of this performance be freely accorded to Plimmer, but we must also state that the acquisition of his staining method has thrown an entirely new light upon the animal experiments which we shall describe later, and has been one of the most important factors in elucidating the entire problem.

As to whether the morphology of these structures is sufficiently constant to enable their ready recognition the following can be stated:

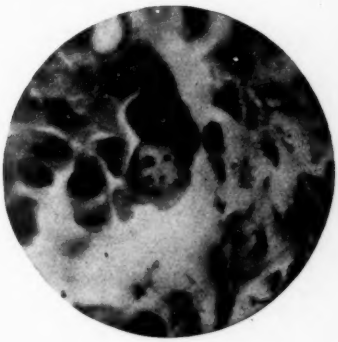
The bodies may be demonstrated in the fresh state, in which case it is a matter of considerable difficulty to distinguish them from fat droplets, which they somewhat resemble, but which have a higher refractive index and do not contain a central structure. The most minute form of the organism might be confused with cocci. In the fresh state the quarter-grown and half-grown forms appear either as spherical bodies with very delicate outlines and containing one or two colorless granules near the centre, or as similar structures of oval form. They may be either intracellular or extracellular. Occasional forms will be met in which the pale structure of the body is projected in the form of a pseudopod; in which case the granules may remain in the larger portion of the structure or one or two may be found in the projection.

PLATE XIII.

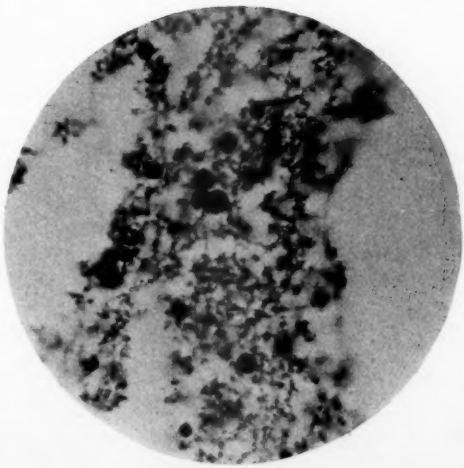


1.

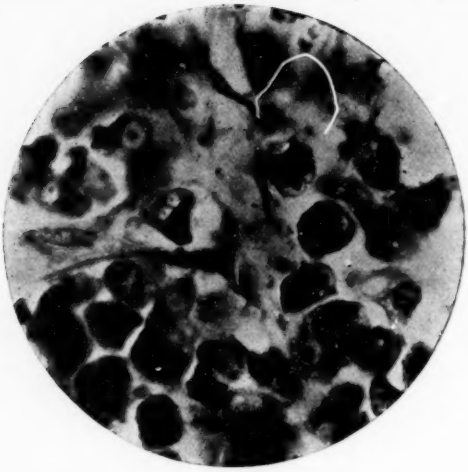
2.



3.

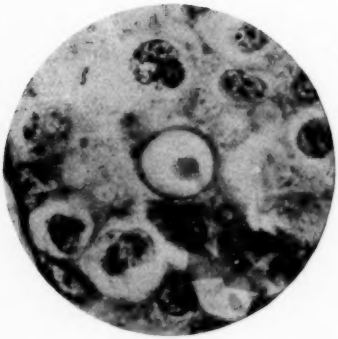


4.

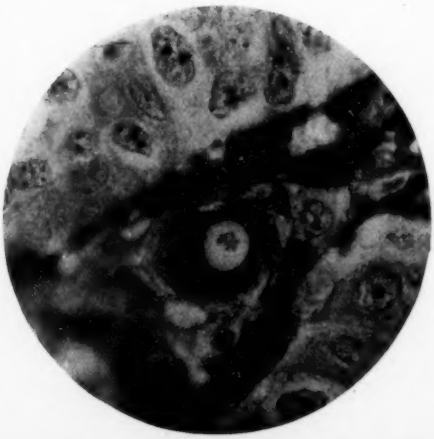


1.

2.



3.



4.

These forms closely resemble the bodies shown in Fig. 2 of the article by Sjöbring in the *Centralblatt für Bacteriologie*, vol. xxvii.

We have never been able to detect any change of form in the intracellular bodies, although scrapings from carcinoma in which they were found have been exposed to various procedures. The extracellular bodies may be occasionally induced to change their form by placing the preparation in a thermostat. In this case we have repeatedly observed that bodies which are spherical changed on the warm stage after a period of some hours, and projected longer and shorter processes. Attempts to stain them in the fresh state have met with varying results. They apparently take on Sudan III., but Dr. Clowes, the chemist of the laboratory, states that this is not a genuine staining reaction.

We find that the organism of vaccine may be stained in the same manner, and we are informed that others have employed Sudan III. as a stain for amœbæ.

Attempts to fix the organisms by heat gave unsatisfactory results, owing to the distortion which they undergo. If cover-slips be made and dried in the air the small, spherical bodies will stain with any of the aniline dyes. The larger forms, however, remain unstained, and appear as spherical or oval clear spaces in the stained material of the cover-slip. The best means to fix them is to make rapid smears after the manner employed in making blood-slips and drop the wet cover-glasses into warm Hermann's fluid or sublimate. They may then be stained with Plimmer's method. We have likewise found that pouring peritoneal fluid which contained them into warm Hermann's fluid or sublimate and treating the coagulum after the manner in which tissue is manipulated gives excellent results, the organisms retaining their form and characteristic appearance. (Plate XIII., Fig. 4.)

The best method for preserving the extracellular forms is by hardening masses of tissue which contain them. An excellent method for hardening the organisms with the pseudopodia projected has recently been described by Eisen in his very excellent article in the *Medical Record* of July 7th of this year. Dr. Eisen has been kind enough to forward us some of his sections, and we can heartily indorse what he has described in epithelioma.

In sections hardened in Hermann's fluid and stained with Plimmer's method the bodies correspond very accurately to the description given by Plimmer. Some of the different types which we have observed are shown on Plate XIII., Figs. 1, 2, and 3, and Plate XIV., Figs. 1, 2, 3, and 4. As to the staining qualities of the organisms, we find that they closely conform to those given by Plimmer—that is, that the central body and capsule of the structure take on a coppery-red or pale rose color. In the case shown on Plate XIII., Figs. 2 and 3, we have succeeded in staining the central bodies with the nuclear stain,

and in some of the cell inclusions only the central portion of the central body takes the nuclear stain, and is then surrounded by a layer of protoplasm, which takes the rose or pink color.

The organisms may appear singly in the cells, or even in large numbers. (Plate XIII., Fig. 3.) We have detected as many as fourteen in one cell. There is no difficulty in detecting the structures in properly hardened and stained material. They can be readily distinguished from vacuoles in the protoplasm by the well-defined capsule and central bodies, their relative uniformity in size, and occasional presence between the cells.

Summing up this phase of the question, it can be unhesitatingly stated that Plimmer's bodies present a characteristic appearance and can be readily differentiated from cell degenerations of the usual type and other structures which they might resemble.

To determine whether or not Plimmer's bodies could be due to cell degenerations, we have carefully examined a large number of sections of well known pathological conditions of known cause, such as tuberculosis and certain bacterial infections, and a large number of animals inoculated with various pathogenic yeasts, and we can state that we have never detected any changes in the epithelial or other cells in this class of diseases which could be confused with Plimmer's bodies.

In attempting to determine the nature of Plimmer's bodies, the fact becomes immediately patent, in reviewing the literature, that many observers have depicted these structures. Scarcely an article has appeared in which the observer has not, more or less accurately, illustrated cell inclusions which are no doubt the characteristic bodies of Plimmer. The slight variations which are encountered in these illustrations are very likely due to the different methods of hardening and staining employed by the different investigators, and the usual subjective equation incident to all illustration by drawings. Figures which are unquestionably intended to illustrate bodies of this nature may be found in a publication of Sawtschenko, *Bibliotheca Medica*, 1895, Abtheilung, D. ii., Heft 4. Those which most characteristically represent Plimmer's bodies are Figs. 18, 19, 30, 51, 57, and 60. In an article published by Jackson Clark, *Centralblatt für Bacteriologie*, vol. xvi., Fig. 6 of Plate III. is a most typical representation of these bodies, and, in like manner, an investigation will reveal more or less characteristic illustrations in the publications of the majority of investigators.

Of especial interest in this connection are the illustrations of Sjöbring accompanying his most recent publication in the *Centralblatt für Bacteriologie*, vol. xxvii. Fig. 1 of this article represents a section through the wall of a *vasa efferentia* in the epididymis. In the protoplasm of the epithelium are shown three typical Plimmer's bodies. This illustration is especially interesting, as the author states it is taken from the

epididymis of an animal from the neighborhood of a fragment of sterile carcinoma which had been implanted in the testicle.

It will, therefore, be seen that many of the observers who have described cell inclusions, in the belief that they were protozoa, have unquestionably seen typical Plimmer's bodies, and it would appear as if Sjöbring, in his most recent publication, was dealing with bodies of at least a very similar appearance.

In all the carcinomata which we have investigated we have found that Russell's bodies could be detected, especially about the periphery of the tumor and in the enlarged regional lymph nodes, even when these were not carcinomatous. In sections stained with Plimmer's method they take on a dense blue-black, but by modifying the stain they can be made a brilliant red, which gives them much the same appearance as they possess when stained with fuchsin. In one case we have succeeded in staining the central bodies of the Plimmer inclusions, and are able to trace a direct morphological relation between Russell's bodies and Plimmer's bodies. In one case of adenocarcinoma of the ovary, which contained a large number of Russell's bodies and protozoan forms, the bodies which correspond to Plimmer's bodies were more or less atypical, probably owing to the hardening agent (sublimate).

From the above it will be seen that Plimmer's bodies are not new structures, but that his hardening and staining methods give them a more characteristic appearance and probably differentiates them in a large number of cases in which, when treated by the ordinary staining methods, they would be invisible.

In form the bodies are almost always round or oval. Occasionally they occur in pairs, in which case they are usually smaller than the single bodies, and present an appearance which is highly suggestive of some form of division. Plimmer describes a budding form of the organism, which, in our experience, is very rare. We have found only one or two bodies which conform to this description.

The fact that certain observers have succeeded in obtaining pure cultures of blastomyces from carcinoma, and the significant experiments of Sanfelice, naturally raise the question as to whether these organisms can be detected in carcinomata. In the examination of our cases we have thus far failed to find any structures which we were willing to consider blastomycetes. During the last two years we have carried out an elaborate investigation of pathogenic yeasts, including Plimmer's organism, Sanfelice's neoformans and lithogenis, the pathogenic blastomyces isolated from a skin lesion by Hektoen, and a similar organism isolated by Gilchrist and Stokes.

A summary of the results of a long series of comparative inoculations with these organisms, as well as a careful morphological comparison, will form the subject of a future publication from this laboratory. The

details of the results will not be entered into here. Suffice it to say that we have never detected a sufficient transformation in the organisms injected to give them an appearance identical with the Plimmer bodies of carcinoma. The nearest approach to such a result is shown in Plate XV., Figs. 1 and 2, which represents yeast cells (Plimmer's) in the lung of a guinea-pig, hardened and stained by his method.

Thus far the distinguishing feature which we have always observed has been the double contoured capsule of the yeast organism, which Plimmer's bodies do not possess. At the same time we have occasionally noted yeast organisms with a single contoured capsule; but in these cases they never presented an appearance which could be confused with a typical Plimmer body. Plate XV., Fig. 1, shows a yeast organism with a single contoured capsule, which, it will be noted, contains no central body. *From a morphological stand-point we have been unable to demonstrate the identity between Plimmer's bodies and transformed yeast organisms.*

The culture experiments in this laboratory have been of a uniformly negative nature. An elaborate bacteriological investigation was carried out by Dr. Pease, former bacteriologist to the laboratory, at the time the tumors were being investigated for the presence of Plimmer's bodies, and in only one case did he succeed in obtaining a culture of a blastomyces. In order, if possible, to find a suitable medium for the blastomyces, in case the negative results were due to unsuitable substrata, we prepared and employed sixty-four different varieties, which it may be of interest to enumerate. In this list the term + is used to indicate acidity, and — alkalinity. The figures indicate the units of acidity and alkalinity recommended by the bacteriological committee.

Bouillon neutral.
" + 15.
" + 5.
" — 15.
" sugar (free).
" glucose.
" lactose.
" saccharine.
" glucose—tartaric acid.
" pig liver.
" " liver—cancer.
" " kidney.
" glucose—cancer.
" " —tartaric acid—cancer.
" dog—cancer.
" asparagin.
" potash soap.
" human glucose—neutral.
" tartaric acid—glucose (human).
" fucus crispus.

Milk.

Serum bovine.
" human.
" dog.
" ascitic.
" hydrocele.
" abdominal fluid.

Urine.

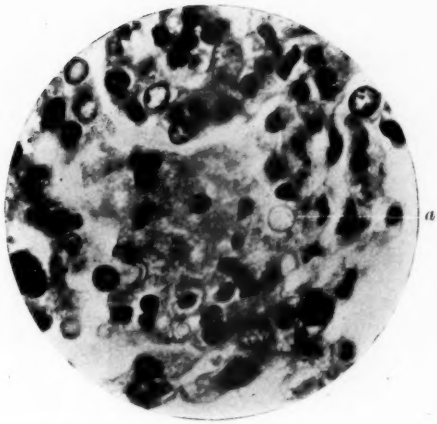
String-beans in aqua dest.
" " " Niagara water.

Bean stems—glucose—tartaric acid.

Beerwort.

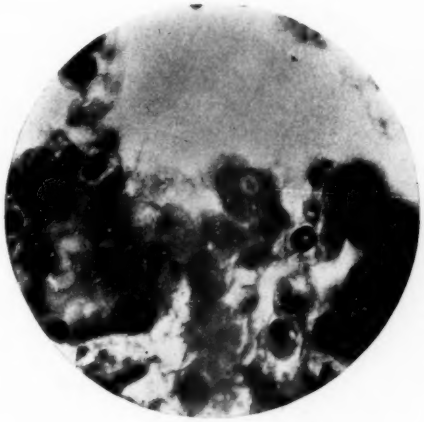
Potato infusion.

Potato.



1.

Plimmer's yeast in lung of guinea pig. Hardened and stained according to Plimmer's method. At *a*, an organism with single contour. (Oil immersion.)



2.

Field from same section as Fig. 1. Yeast with thick capsule in act of budding. Central bodies. (Oil immersion.)

	Hay infusion.
Agar neutral.	" glucose water.
" + 15.	
" — 15.	Sugar water.
" potato.	Glucose water.
" glucose.	
" glucose—tartaric acid—cancer.	Fucus crispus water.
" beerwort.	" " hay infusion.
" serum.	
" hay.	Cabbage water.
" glucose—hay.	
" glycerin.	Lettuce water.
" fucus crispus.	
" cabbage water.	Bread.
Gelatin neutral.	Human fat.
" 15.	
" potash soap.	Casagrandi.
" beerwort.	
	Nahrstoff (Hayden).
	" " soda.

In our experimental inoculations of animals we have usually been able to obtain the blastomyces by cultivation after the inoculation. The majority of lesions which we have produced have been those of typical blastomycetic mycosis with abscess formation, or characteristic granulomata containing the organism.

Having thus determined to our satisfaction that the yeast organism was not the essential cause of carcinoma and sarcoma and could not be confused with the organism we had already observed in fresh scrapings of carcinoma and in our experimental animals, and having already convinced ourselves of the identity of the organisms found in the fresh state and the forms known as Russell's bodies, Plimmer's bodies, and protozoan forms in the tissues, our attention was called to the possible relation between these inclusions in cancer and the vaccine bodies observed after inoculation of the cornea with vaccine virus, by an article by Dr. C. Gorini, in the *Centralblatt für Bacteriologie*, September, 1900, vol. xxviii., No. 8/9, entitled "Ueber die bei der mit Vaccine ausgeführten Hornhautimpfung vorkommenden Zelleinschlüsse und über deren Beziehungen zu Zellinklusionen der bösartigen Geschwülste." We had already noted the similarity of Russell's bodies to the illustrations of inoculated corneas, and it remained for us to harden and stain the cornea of rabbits which had been inoculated with vaccine virus after Plimmer's method. The result of our comparative test in this case shows not only that the half-grown form of the vaccine organism is very closely related in appearance to the bodies of Plimmer, but that the bodies of Russell in carcinoma and the protozoan forms in

carcinoma, all have their prototypes in the various stages of development of the vaccine organism. (See Plate XVI., Figs. 1 and 2.)

This striking confirmation of Gorini's observation was more than doubly confirmed when, after the recent announcement of Dr. M. Funk, in the *British Medical Journal* of February 23d of this year, on the cultivation of the vaccine organism, we repeated his experiment and found that the organism of vaccinia, while undergoing development, shows essentially the same phases we had already noted in the organisms observed in fresh scrapings of cancer and in the peritoneal fluid and blood of cancer cases.

Having thus convinced ourselves that the organism with which we were dealing was a protozoon belonging in the same group with the vaccine organism, it remains to be seen what evidence can be produced to show that these protozoa, which are a constant occurrence both in the fresh material of cancer and which we had cultivated and identified in the tissue under the form of Russell's bodies, Plimmer's bodies, etc., are the cause of cancer.

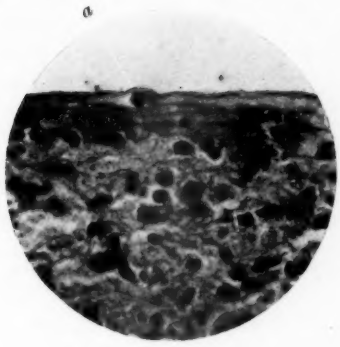
We have found it necessary to carefully restain the tissues of all our earlier animals with Plimmer's method, and, as this work is not yet complete, we deem it advisable to withhold the complete series until we are in a position to consider certain phases of the question which will require an investigation of tissues from other diseases, which are possibly protozoan infections.

That the protozoon of cancer is capable of producing even in man lesions of a very different nature from infection of the epithelium, seems to be strongly indicated by the following observation:

Case 108. Mrs. E., aged forty-five years. Well-developed cancer of right breast, with axillary lymph nodes, operated upon February 5, 1901, at Buffalo General Hospital by Dr. Park. The case in question attracted our attention because of a pigmented pustule beneath the skin of the right axilla. The clinical notes in brief are as follows:

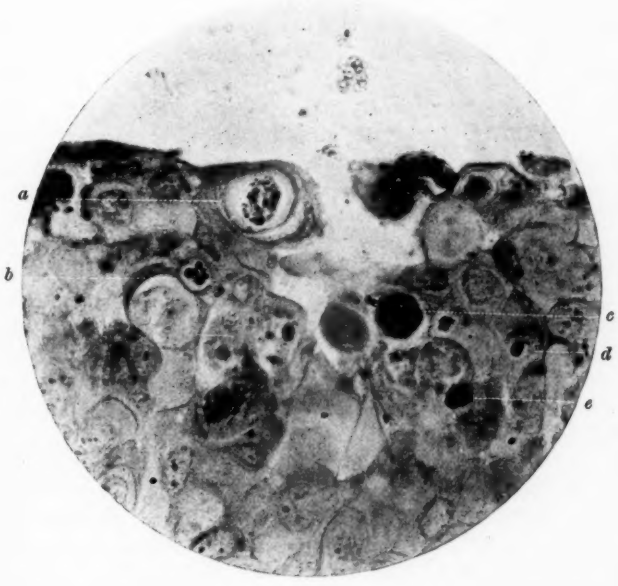
Three years ago observed a retraction of the nipple. Six weeks ago noted a well-defined tumor in the right breast. At the same time a small nodule was felt beneath the surface of the skin of the right axilla. This developed in a region which was subject to irritation by the edge of the patient's corset.

In removing the tumor Dr. Park carried a flap up into the axilla, removing the axillary lymph nodes and including the pustule above mentioned. The tumor reached the laboratory one hour and a half after the operation. An inspection of the tissues removed shows them to consist of an enlarged right breast with a thickened and retracted nipple. The flap of skin removed is included between two curved incisions. At a distance of about five inches from the nipple there is an elevation of the skin somewhat larger than a pea. The skin cover-



1.

Recent vaccination of cornea (third day). At *a*, young vaccine organism (analogous to Russell body) entering epithelial cell of cornea. Oil immersion. (Plimmer's method.)



2.

Section of vaccinated cornea (seventh day). (Plimmer's method.) At *a* and *b*, bodies analogous to Plimmer's bodies; *c* and *e*, younger forms of parasite. At *d*, a small organism within the nucleus of an epithelial cell.

ing it is glazed, and on palpation it is found to contain fluid. On opening this pustule a small amount of dirty red fluid escapes. Examined in the fresh state with the microscope this material is found to consist of leucocytes, red blood-corpuscles, and a large number of cells, from five to ten times the diameter of a red globule, possessing coarse and fine granulation. Some of them contain highly refractive bodies somewhat finer than ordinary cocci, but the greater number have embedded in their protoplasm poorly defined, hyaline, pale-green, spherical bodies, somewhat smaller than red blood-corpuscles. When treated with acetic acid these hyaline bodies and the granules of the cells become more distinct, and nuclei may be made out. Beside these cells are a large number of ordinary pus cells, which form the principal constituent of the fluid.

On cutting into the breast it is found to consist for the most part of fat, through which runs sharply-defined bands of carcinomatous tissue. At no point in the structure is a well-defined tumor mass. From the most vascular portion of the carcinoma fresh scrapings were made. Under the microscope these scrapings are found to consist of closely packed epithelial cells with vesicular nuclei. A large amount of free fat is found in the preparation, but the cells show very slight evidence of fatty degeneration. Between the fat droplets are a considerable number of small, greenish hyaline bodies, which, in our experience, can be recognized from fat by the slight difference in refractive index and color.

Portions of the tumor were hardened in Hermann's fluid. On examining the axillary fat a group of five or six enlarged lymph nodes may be detected. On dissecting these out and incising them they are found to contain more or less extensive deposits of cancer. Sections of these were hardened in sublimate and Hermann's fluid.

Fresh examination of scrapings from these lymph nodes reveals the presence of bodies which correspond to what we have recognized as the fresh Plimmer body. They are composed of pale fluid protoplasm, and contain a group of fine granules. Their outlines are well defined, and in many cases they appear to be sending out projections. In some of these bodies the protoplasmatic granules show active Brownian movement. An examination of the sections from the tumor and lymph nodes shows the case to be one of soft carcinoma of the breast with metastases in the axillary lymph nodes. Stained with Plimmer's method a considerable number of the various forms already mentioned can be found—Russell's bodies, Plimmer's bodies, and protozoan forms. A section through the pustule hardened and stained with Plimmer's method reveals a most interesting condition. It consists of an abscess in the subcutis. Upon the surface the papillæ of the cutis are normal, but directly above the abscess three or four of the papillæ are seen to be hypertrophied

and extend into the subcutaneous tissue. The abscess appears to be made up for the greater part of masses of spherical bodies somewhat smaller than leucocytes. There is no apparent inflammatory reaction about the periphery. The bloodvessels show no engorgement. (See Plate XVII.) Under high dry power the abscess is found to be composed of leucocytes with horseshoe nuclei and a large number of spherical and oval, deeply-stained bodies, which closely resemble large Russell's bodies. (See Plate XVIII.) Beside the leucocytes and these small spherical bodies are a large number of large, oval, and spherical cells with one or two nuclei. Many of these contain deeply-stained spherical bodies, somewhat smaller than the free spherical bodies in the tissue. Others of nearly the same size contain a large number of small hyaline bodies which do not take the stain. These, we are inclined to believe, are the sacs of the parasite. (See Plate XVIII.)

Beside the small forms and large sacs we have found a number of spherical bodies about four times the diameter of the leucocyte, which stain brilliantly with the Bordeaux red of the preparation. In a number of these bodies we have found evidences which are strongly suggestive of segmentation, after the manner recognized in malarial parasites. The bloodvessels within the focus contain, beside red blood-cells, large numbers of the deeply stained oval and spherical Russell's bodies. In some cases the endothelium of the capillaries is greatly swollen and contains one or more of these deeply stained bodies.

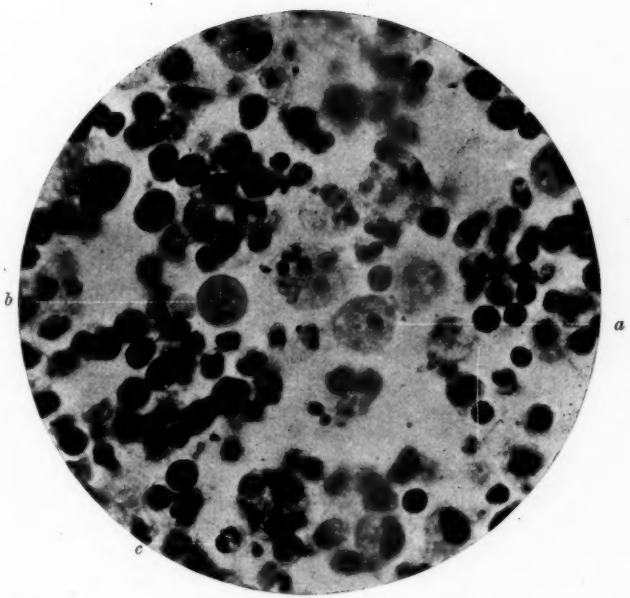
We are inclined to believe from this observation that this pustule is the result of embolic deposit of the parasites from the cancer of the breast, and we would interpret it, pending further observation, especially in the light of our animal experiments, as indicating that the organism of cancer is capable of producing other lesions than that of epithelial infection.

The material with which our animals were inoculated consisted of peritoneal fluid from cases of abdominal carcinosis, fluid from the interior of malignant ovarian cysts, sterile cancer, and dried sterile cancer and lymph nodes rubbed up with salt solution. Some of these latter contained metastatic deposits of cancer, but a number were simply the enlarged lymph nodes, in which we had already detected Russell's bodies. In each case the fresh material was carefully examined before and the presence of parasites was determined. The presence of parasites was likewise verified in hardened sections of the material where this was possible

The following is summarized from the complete list of animals, which will appear in the second part of this communication:

PLATE XVII.

Embolic skin pustule from carcinoma of breast. Deeply stained spherical bodies are protozoa. (Low Power.)



Field from center of skin pustule, shown on Plate XVII. At the center remains of spore cysts. One at *a* contains a single deeply stained body (young parasite). At *b*, a half-grown organism stained red. *c*, a leucocyte. Remainder of field filled with young spherical and oval organisms and polymorph nuclear leucocytes. (Plimmer's method.) (Oil immersion.)

Animals Inoculated with Material and Cultures from Carcinoma and Sarcoma in Man.

12 guinea-pigs inoculated in the jugular with peritoneal fluid, died in 22 and 19 days respectively.
14 " inoculated in the peritoneum with peritoneal fluid, died in an average of 58 days.
1 guinea-pig inoculated in the right eye with peritoneal fluid, died in 10 days.
1 " inoculated in the jugular with filtered serum, died in 304 days.
1 " inoculated in the jugular with cancer mush, died in 15 days.
4 guinea-pigs inoculated in the peritoneum with cancer mush, died in an average of 57 days.
11 " inoculated in the peritoneum with dried lymph nodes, died in an average of $45^{4}/_{11}$ days.
7 " inoculated in the peritoneum with sarcoma, died in an average of $92^{2}/_{7}$ days.
2 rabbits inoculated in the ear vein with peritoneal fluid, died in 93 and 17 days respectively.
1 rabbit inoculated in the ear vein with filtered serum, died in 164 days.
1 " inoculated in the peritoneum with cancer mush, died in 292 days.
1 " inoculated in the peritoneum with sarcoma, died in 278 days.
1 " inoculated in the mediastinum with sarcoma, died in 41 days.
1 dog inoculated in the peritoneum with peritoneal fluid, died in 64 days.
1 " inoculated in the peritoneum with sarcoma, died in 160 days.

Animals Inoculated from Animals Infected with Parasites from Carcinoma and Sarcoma in Man.

Pig 23, inoculated in abdominal wall with lymph gland and peritoneal fluid from Pig 16, died in 9 days. Case I., adenocarcinoma of the omentum.
" 55, inoculated in abdominal wall with several nodes from Pig 52, also portion of old original tumor, died in 4 days. Case LVII., squamous epithelioma of skin.
" 72, inoculated in abdominal wall with B–pig 67–a, 2 c.c. node emulsion in water, died in 37 days. Case L., enlarged axillary lymph nodes recurring sarcoma breast.
" 75, inoculated in abdominal wall with $2^{1}/_{2}$ syringes B–pig 66–a, nodes powdered in sterile water, died in 59 days. Case L., enlarged axillary lymph nodes recurring sarcoma breast.
" 73, inoculated in abdominal wall with 2 c.c. nodes in water B–pig 64–a, died in 48 days. Case L., enlarged axillary lymph nodes, recurring sarcoma breast.
" 76, inoculated in abdominal wall with A–pig 68–a, nodes powdered in water, died in 17 days. Case LXI., carcinomatous lymph nodes from axilla accompanying well-developed carcinoma of breast.
" 15, inoculated in the abdominal wall with 2 c.c. fluid from peritoneum Pig 13, died in 8 days. Case XXIII., recurrent sarcoma thigh.

The points of interest are that 14 guinea-pigs, inoculated in the peritoneum with peritoneal fluid containing the organism, gave an average

length of life of fifty-eight days; 4, inoculated in the peritoneum with cancer mush, gave an average length of life of fifty-seven days; 11, inoculated in the peritoneum with dried cancerous lymph nodes, gave an average length of life of forty-five and four-elevenths days; 6 guinea-pigs, inoculated with peritoneal fluid and lymph nodes from animals which were infected in the above manner, gave an average length of life of twenty-nine days—a little more than half the length of time for the animals inoculated directly from man.

This unquestionably shows the increased virulence of the organisms after passing through one animal. We are continuing these experiments in modified form and shall report upon them later.

The average length of life for rabbits inoculated in various regions with the different forms of material used shows the greater resistance of this animal to infection. In our most recent experiment we have succeeded, by growing the organism in a collodion sac (suggested by Dr. Clowes) in the peritoneal cavity of a rabbit, in so increasing the virulence of the organism that a healthy rabbit inoculated in the ear-vein died of general hæmatogenous infection from the organism after a period of fifteen days. (Rabbit 56 of the list.)

It will be shown from these experiments that animals are readily infected when inoculated with carcinomatous material as well as pure cultures of the organism. The peritoneal fluid used in all of these inoculations was bacteriologically sterile, and consisted essentially of a pure culture of the organism. Two animals—one guinea-pig and one rabbit —which were inoculated with filtered serum from which the organism had been removed, gave a respective length of life of 304 days and 164 days. The organs of these animals were free from parasites.

The macroscopical pathological findings in these cases were generally uniform. All the animals were greatly emaciated and presented, on opening the abdominal cavity, collapsed intestines, reddened peritoneum, enlarged peritoneal lymph nodes, and a moderate amount of clear, straw-colored fluid. The lungs were dark red in color, collapsed; heart contained but small amount of blood; the spleen was enlarged and reddened; the liver in many cases was hyperæmic, and the kidneys were generally injected.

One dog (Dog 18) presented a large lymphoma of the spleen. This case will be considered separately. Dog 8, inoculated from sarcoma, Case XXIII., shows typical metastases of sarcoma in all of the regional lymph nodes.

In almost all cases a fresh examination was made of the peritoneal fluid, the organs, and the blood, and, wherever made, large numbers of the parasites could be readily detected, as already described.

Two guinea-pigs and two rabbits, inoculated in the jugular with peri-

toneal fluid, show macroscopical lesions in the lungs very closely resembling those reported in our Pig 1—that is, minute white dots scattered through the pulmonary structure, usually localized in the neighborhood of the bronchi. Sections from these lungs, stained with hæmatoxylin, show the presence of multiple beginning adenocarcinoma of the bronchi.

These we should interpret as beginning adenocarcinoma of the lung in 4 animals, making, with our Case I., 5 animals in which the injection has been followed by infection of the bronchial epithelium. One guinea-pig presents a condition of the lungs and liver which we wish to interpret as *primary carcinoma of those organs*, and 1 dog presents a lymphoma of the spleen, the size of a large hazel-nut, which we also attribute to the inoculation of the animal with dried lymph nodes from a case of carcinoma. The tumor cells in all of these animals contain the characteristic forms of the parasite.

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1. THORACIC ANEURISM. 2. CARCINOMA OF SUPERIOR MAXILLA. 3. CHOLELITHIASIS AND SUPPURATIVE CHOLECYSTITIS. 4. INGUINAL HERNIA OF (*a*) BLADDER; (*b*) CÆCUM.[1]

By Bern B. Gallaudet, M.D.,

of New York,

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1. *Thoracic Aneurism.* This case was an aneurism of the thoracic portion of the left common carotid artery. The patient was a male, aged thirty-nine years, and came under observation in November, 1899. His general condition as regards strength, health, etc., was perfect. Previous history as regards disease of all kinds was absolutely negative.

At the age of twenty-three years, sixteen years before admission to Bellevue Hospital, he had received a pistol-shot wound in the left side of the neck, which healed without complication. Nothing developed until the fall of 1897, when a swelling was noticed under the scar, well down in the neck. From that time the swelling increased in size, slowly but steadily, and with increasing severity of pressure-symptoms, pain, dyspnœa, and coughing, which interfered with sleep and were beginning to undermine the patient's health. Medical treatment had been tried for six months, but without relief.

Examination: On inspection a swelling, about the size of a lady apple, was observed in the left side of the neck close to the sterno-

[1] Read before the New York Surgical Society, February 27, 1901.

clavicular articulation. Palpation showed the existence of the regular symptoms of a sacculated aneurism and also that the aneurism was slightly overlapped by the sternomastoid muscle. On gentle manipulation the overlying tissues appeared loose, while active motions of the neck in all directions were normal. Auscultation confirmed the diagnosis of aneurism and also showed a downward extension into the thorax. Pulsation in the left radial artery was synchronous with that of the heart, this probably excluding the left subclavian artery as the point of origin. There were no signs of communication with the internal jugular veins nor were any bony parts involved.

The question of treatment was now to be considered. The patient was in good condition; his arteries, heart, lungs, and kidneys were normal. As medical treatment had been unavailing, there was the choice between an operation and doing nothing, since such measures as needling and introducing wire did not seem to be indicated. Furthermore, the patient was steadily growing worse and was desirous, as were his friends, of having an operation performed, fully appreciating its possible fatal outcome. If it had been merely a question of ligation based on a definite size of the tumor there might have been less doubt as to what to do; but the somewhat indefinite limits of the aneurism certainly suggested possibilities of failure if ligation were attempted with an ordinary incision, even if the latter were deepened by removal of pieces of the sternum and clavicle. It was, therefore, decided to operate and to make an unusually large exposure of the aneurism, with the idea not only of having plenty of room for ligation, but also of possible extirpation of the sac.

The operation was performed ten days after admission and was as follows:

The incision followed the anterior border of the sternomastoid muscle, extending from its mid-point to the middle line of the sternum, crossing the sternoclavicular joint. From this point a second incision was carried outward, parallel to and just below the clavicle, well beyond the middle of the bone. The soft parts were then retracted at the apex of this triangle and at the outer end of the clavicular incision sufficiently to use a wire-saw, by which were divided first the clavicle at the point indicated, and then the sternum and cartilage of the first rib, the latter being cut through close to the former. The flap was then dissected upward and outward, the dissection being carried under the sternomastoid, which thus formed part of the flap, the bony portions being the inner half of the clavicle, the sternoclavicular joint, and the adjoining portion of the sternum.

The raising of this flap was extraordinarily difficult on account both of dense adhesions and hemorrhage, almost every cut with knife or scissors and even blunt separation of the tissues being followed by profuse venous oozing and spurting.

After the flap was raised the aneurism was found to extend mesially over the common carotid and downward under the first rib. It was also bilobed, a bit of fascia constricting it, so that the smaller part lay over the scalenus anticus muscle. The stiffness of the sac and the presence of the first rib prevented the finger from getting in under it from any direction. The rib and cartilage were then resected as far out as the subclavian vein, the constricting band removed, and adhesions separated

below. These procedures allowed a more extended palpation, which showed that the sac reached downward over the left innominate vein and that it arose neither from the aortic arch nor from the subclavian artery.

It was then determined to ligate the left common carotid, but the patient's condition forbade anything more. In clearing the sac several profuse venous hemorrhages had occurred. These, together with the previous hemorrhages and the length of time elapsed—now more than four hours—necessitated infusion and stopping the operation. The wound was packed with sterile gauze, several clamps left *in situ*, the flap brought down, and a large dressing applied.

The next morning the patient was in good condition and desired a continuation of the operation when told that it was not yet complete.

Five days later he was again etherized and the wound opened. The thin layer of granulation tissue, which had spread itself more or less completely over the parts, was wiped away and the clamps left at the first operation removed. The lower end of the left carotid was then exposed and ligated about a quarter of an inch above its origin, which was followed by immediate cessation of pulsation within the sac. This procedure, however, was one of no small difficulty, owing to adhesions and hemorrhage, and required nearly an hour's time.

Had the operation been terminated then the patient would certainly have survived and possibly made a more or less permanent recovery, provided the conditions of the wound permitted. These were somewhat difficult to deal with. The sac was now enormously enlarged and projected not only in the neck but also between the cut edges of the sternum and first rib, thus absolutely precluding any replacement of the flap as originally formed. To replace the flap would have necessitated removal of the bony portions and stretching the soft parts over the aneurism.

Primary union would have been impossible and healing could take place only by means of a long granulation process, attended by probable sepsis, to say nothing of secondary hemorrhage.

Extirpation of the sac was accordingly decided upon, and, as a preliminary step, the upper part of the artery was exposed and ligated. An attempt was then made to raise the aneurism from its bed by retracting it mesially and dissecting in under it along its outer border. After about half an hour, however, the amount of adhesions and venous hemorrhage encountered showed that removal in that way was impossible. Since the artery was tied in two places it was decided to split the sac and remove it piecemeal.

Time for infusion having been allowed, the sac was cut into and split, the upper and lower portions of the internal jugular vein having been previously sufficiently cleared of adhesions to permit clamping should it be necessary on account of a possible communication with the vein. The vein should have been ligated, but the patient's condition demanded the loss of no time.

On splitting the sac it was found to contain a quantity of laminated fibrin loosely arranged concentrically around the wall, which was thin.

During the removal of some of this fibrin a sudden violent venous hemorrhage from within the sac took place, which was stopped at once by clamping the jugular at the places prepared. The sac was then

partly cleared of blood and clot in an endeavor to find an opening into the vein.

All further investigations, however, were then brought to an end by the quiet death of the patient.

A post-mortem examination, not obtainable later, might, it is true, have been made at once, even if a trifle irregular; but, to speak frankly, disappointment at the fatal result was sufficiently keen to cause entire loss of interest.

This case is reported simply because of its general interest as touching on the question of extirpation of aneurisms. I fear that there can be but little learned from it. There was nothing in the physical signs at the examination indicative of the difficulties to be encountered. Therefore, until these thoracic aneurisms can be more accurately mapped out it would seem best either always to be prepared for adhesions and hemorrhage—which, of course, may not be found—if an operation is undertaken or not to operate at all. In this particular case no operation should have been performed, but this was certainly not positively evident, in the author's judgment, before the operation.

2. *Carcinoma of Superior Maxilla.* Male, aged forty years, came under observation early in January of this year.

The growth occupied the roof of the mouth and involved the gums and alveolar processes of both maxillæ, extending from the first molar tooth of the right side to the canine tooth of the left. It also involved the anterior half of the hard palate of the right side. The mass was soft, friable, nearly filled the mouth, and was constantly bleeding, with an offensive discharge. General health was greatly depreciated, with marked cachexia. The tumor had grown rapidly, beginning as a small lump behind one of the front teeth only eight weeks previously. The nasal fossæ were normal. No glandular enlargements.

It was evident that if removal were to be attempted three things were desirable, viz., to minimize hemorrhage, to exclude blood and discharge from the air passages, and rapidity of removal, which last would be greatly facilitated by adoption of the first two.

Accordingly, on January 16th, the external carotid artery was ligated on both sides, a tracheotomy tube inserted through the cricothyroid membrane, and the pharynx packed with a large sponge with string attached.

The upper lip was then split in the middle line and the growth extirpated by use of rongeur forceps. Venous oozing was considerable, but ceased as soon as the limits of the tumor were reached. No other form of hemorrhage occurred.

The portions of bone removed included the alveolar process of the right side as far back as the second molar tooth, the alveolar process of the left side as far as the first bicuspid tooth, and the contiguous portions of the hard palate of both sides as far back as the posterior third, thus leaving a bony bridge in that situation. Healthy bone was removed on all sides of the tumor, as indicated by its firm resistance to the biting of the forceps. The nasal fossæ were normal as well

as the antrum of the right side, which was necessarily opened from below.

The cavity was then packed and the lip sutured. The entire operation lasted about an hour and a half. The pharyngeal sponge was removed after a few hours. Recovery was uneventful. The tracheotomy tube was removed on the second day, the wound healing inside of a week. The incisions over the arteries closed by primary union.

The pathologist's report was that the tumor was a carcinoma, originating probably from the mucous membrane covering the gum; hence, strictly speaking, a *squamous-celled epithelioma.*

The patient's present condition is one of great comparative comfort. He eats and sleeps well and has gained considerable weight. There is very little falling in of the face, which can later be easily corrected by a plate. Cicatrization is not yet complete. There is at present no evidence of a recurrence, which, however, will probably take place, and this the patient understands.

My reasons for reporting this case are two: First, the rather unusual character of the growth, sarcoma being the common form of malignant epulis or tumor starting on the gum; and the second is to call attention to the great advantages secured in these operations by preliminary tracheotomy, packing the pharynx, and ligating the carotids—procedures which many operators regard at least as superfluous and unnecessary, but which, in this case at all events, would have been indispensable.

3. The case of *cholelithiasis* and *suppurative cholecystitis* was remarkable in that the patient, a woman, aged thirty-five years, gave no symptoms indicative of these conditions for a period of eight or ten weeks, during which time, however, she had marked jaundice and evening rise of temperature to between 101° and 102° F., clay-colored stools, etc. No local pain, nor tenderness, nor hyperleucocytosis were present.

She was finally transferred, October 22, 1900, to the surgical side (Bellevue Hospital) for an exploratory incision. This was performed, and a moderately distended gall-bladder was found and opened and nearly an ounce and a half of pus evacuated. Two stones were then extracted, and a third was found impacted in the neck of the bladder and extending to the junction of the cystic and hepatic ducts, the former, of course, being greatly distended. The stone was removed after some manipulation. The stones were about three-eighths of an inch in diameter. More pus followed the removal of the last stone, showing a state of suppuration of the bile-ducts. Cholecystostomy was performed and recovery was uneventful. Bacteriological examination of the pus showed the ordinary mixed pyogenic infection.

4. *Right Inguinal Hernia of the* (*a*) *Bladder.* This subject has attracted considerable attention during the past few years and the present case is reported on that account.

The patient, referred to me by Dr. McSweeny, of this city, was a male, aged fifty-seven years, and very stout. The tumor appeared four years before admission to the hospital, in September last, rather suddenly and from no apparent cause. It increased in size slowly but steadily. Complete reduction was impossible during the last three years, but increase in size just before and decrease in size just after micturition were noticed. These symptoms, of course, indicated the probable diagnosis, which was confirmed at the operation, which the patient came in for owing to increasing pain and discomfort.

The hernia was a large one and extended into the scrotum. When the sac was opened careful examination of the protruded portion showed it to be fully one-half of the bladder. Reduction was greatly facilitated by withdrawal of about six ounces of urine through a catheter introduced through the penis. Nothing abnormal was found as to the sac, the tunica vaginalis being intact. Closure of the wound; uneventful recovery.

The hernia of the (*b*) *cæcum* deserves a passing mention, owing to its rarity, and especially this case, as it was on the left side. The diagnosis was not made until the sac was opened, the symptoms having been those of a regular reducible inguinal hernia of good size, but with commencing pain, discomfort, and constipation. As the patient was not in first-class condition, no exploration was made to determine the exact condition of the mesocolon, etc., the part being at once returned and the wound closed. Recovery uneventful.

This must have been simply a congenitally too long ascending mesocolon, or a condition of *incomplete revolution* of the large intestine resulting in a mesially placed cæcum and ascending colon, the mesentery and small intestines lying over to the right of the vertebral column. Transposition of viscera was excluded by a careful examination after the operation.

Finally, in connection with these hernia cases, I should like to mention a method of operating which I have used during the past four or five years and with great satisfaction. Without claiming any especial originality for it, I have not seen it described anywhere. It is simply this:

A Bassini operation is done in all respects except that the aponeurosis of the external oblique is sutured *under* the cord instead of over it, this feature being the same as in Halsted's operation, and in my opinion lending additional strength to the abdominal wall, which is thus made solid, so to speak, under the cord.

THE CARBOHYDRATES OF THE URINE IN DIABETES INSIPIDUS.

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(*From the William Pepper Laboratory of Clinical Medicine, Phœbe A. Hearst Foundation.*)

Recently Rosin and v. Alfthan reported their results from the estimation of the unfermentable carbohydrates of the urine in diabetes mellitus. They make the interesting statement that beside the well-known excretion of glucose in pathological quantities there is in this disease a marked increase in the unfermentable carbohydrates. The daily amount of the total urinary carbohydrates under normal circumstances was never, in their experience, notably more than 5 grammes, and averaged roughly about 1.6 grammes. Similar amounts have been found with normal subjects by several other workers. On the other hand, the smallest daily amount of unfermentable carbohydrate alone in fermented diabetic urine was found by Rosin and v. Alfthan to be about 9 grammes, and in some instances they demonstrated as much as 20 grammes. They conclude from these results that diabetes mellitus can no longer be looked upon as a pure "glucose disease," but is rather a disturbance of carbohydrate metabolism in general.

The method used was precipitation of the carbohydrates by benzoyl chloride in the presence of sodium hydrate. The carbohydrates come down after prolonged shaking of the mixture as benzo-esters, and when the method is properly carried out the precipitate can be fairly readily collected on a filter, washed, dried over sulphuric acid, and weighed. Since the method was described by Baumann it has been investigated by Wedenski, v. Fodor, Roos, Lehmann, Salkowski, Baisch, and Lemaire, and it has been shown that the results obtained indicate with a very fair degree of accuracy the amount of carbohydrate in the urine, when this is small, as is the case under normal circumstances. The precipitate seems to be composed very largely of the esters formed from the carbohydrates, and although there is a slight admixture of nitrogenous matter and salts, and perhaps the esters are in small part not the product of carbohydrates, the error is not sufficient to interfere with the use of the method as an index of variations in the carbohydrate excretion.

Several points in the papers by Rosin and v. Alfthan arrest one's attention. In the first place, they note that it is of interest to learn whether the unfermentable carbohydrates are still excreted in large amounts in diabetes mellitus when the glucose excretion has disappeared

under the influence of diet. This might prove to be a point of serious importance in prognosis. Further, v. Alfthan states that in one case of diabetes insipidus which he had under observation, but which at the time of his report had not been completely investigated, the carbohydrates seemed to be increased. If an increase could be shown in a considerable percentage of cases of diabetes insipidus it might indicate an interesting relation between this affection and diabetes mellitus. These suggestions led me to make a series of estimations of the esters formed by this method in the urine of a patient in Dr. Stengel's wards at the University Hospital.

The man, who was an intelligent clerk, aged twenty-seven years, was admitted January 7, 1901, with a history of rather sudden onset, in June, 1900, of polyuria and excessive thirst. This had persisted and had been accompanied by decided loss of weight—about thirty pounds. He stated that his physician had examined his urine repeatedly and had told him that he had diabetes, but he had had no notable increase of appetite and no other symptoms that would strongly indicate the existence of diabetes mellitus, and the urine when he came to the hospital contained no sugar and no acetone, or diacetic acid; albumin and casts were likewise absent. The daily amount of urine was, however, above 4000 c.c., and he had excessive thirst. At the time of admission it was readily discovered that the man was in the early stages of typhoid fever, and he went through a typical mild course of this disease. It seemed possible from the history that he gave that he actually had diabetes mellitus and that the glycosuria had disappeared under the influence of the typhoidal infection. It was with the thought in mind that under such circumstances the benzoyl chloride method might prove to have actual diagnostic value that the estimation of the esters was first undertaken, for a persistent excess in their amount may perhaps be present under such conditions, and if present would probably be a valuable indication of the actual existence of diabetes mellitus in the temporary absence of glycosuria. This point is certainly worthy of investigation, as is the amount of esters found by this method in the urine of those persons who are constantly ready subjects of alimentary glycosuria, those who have hereditary predisposition to diabetes mellitus or other metabolic disturbance, or those who for any other reason are suspected of being ready subjects of diabetes mellitus. The further course of the case under discussion has demonstrated that it is not diabetes mellitus, but, as seemed highly probable from the beginning, diabetes insipidus. Sugar has always been absent from the urine, and the man has had no symptoms excepting undue thirst and polyuria, barring those of typhoid fever. The daily urine now averages about 4500 c.c.

The results obtained in estimating the esters may then be considered solely in their relation with diabetes insipidus. I was unable for a number of reasons to carry out the work until the man had practically begun his convalescence from typhoid fever; the diuresis had been a little reduced by this time through limitation of his fluids so far as was compatible with comfort.

The conclusion that may at once be drawn from the figures in the following table is that the carbohydrates were not increased; the figures obtained by control estimations of the esters and by coincident nitrogen estimations for a part of the time (Kjeldahl method) are given for reasons which will be noted later:

Date.	Amount of urine in c.cm.	Esters in gms.	Nitrogen in gms.
February 7	3670	2.752	....
" 8	3820	6.494 6.229	....
" 11	3280	2.427 2.099	....
" 12	3370	2.830 2.897	....
" 13	3450	2.484 2.691	14.076
" 14	4050	2.277 2.754	13 923
" 15	4100	1.517 1.413	12.628
" 16	2120	1.611 1.484	8.814
" 18	3400	1.666 1.768	15 803
" 19	1800	1.512 1.368	11.551
" 20	1840	1.325 1.288	9.991

The figures of February 8th are, to be sure, somewhat abnormally high, but they are so wholly at variance with all the other results in this case that I am inclined to think that there was an error in technique. The close correspondence of the control results speaks against this (the two estimations were carried out separately from the beginning), but even though the figures be correct the result is such an isolated one that it deserves no special comment, and all the other figures are wholly within the normal range. So far, then, as this case goes the results speak against the probability of any marked increase in the urinary carbohydrates in diabetes insipidus. One would certainly be inclined to anticipate this from the beginning, as no other similar relation between this disease and diabetes mellitus has been demonstrated. I should not be surprised, however, were a rather high excretion of urinary carbohydrates shown to be present in many cases of diabetes insipidus as a result of the excessive diuresis alone, not as an indication of disturbed carbohydrate metabolism. An increase of the urinary carbohydrates in this disease, unless very marked, could scarcely be looked upon as evidence of any primary disturbance of the metabolism of carbohydrates, for it is well known that flushing the system

with large quantities of water will cause a marked increase of the nitrogen output, and I have shown that this persists over a considerable period, and perhaps constantly so long as the excessive amounts of water are taken; a positive nitrogen balance may even be converted into a nitrogen loss in this way. Similar results were obtained by Ter Gregorianz and Karchagin in normal subjects in nitrogen equilibrium, and by Matzkevich and Grusdiev in subjects of typhoid fever who showed a negative nitrogen balance. It is wholly probable, then, that the constant flushing in diabetes insipidus may carry off an abnormally large amount of carbohydrates in the urine, and that a portion of the increase in diabetes mellitus which was observed by Rosin and v. Alfthan may be due to the same cause, though this alone could not produce the very marked change seen in the latter affection. Another fact which would lead one to expect an increase with the free diuresis of diabetes insipidus is that actual glycosuria may be produced by some diuretics which act directly upon the kidney. That increase or decrease in the diuresis does cause an increase or reduction in the urinary carbohydrates is, I think, shown fairly definitely in the table given above. From February 15th to February 20th, inclusive, the man's fluids were reduced to as low a point as was possible without causing serious distress. The excretion of urine remained high on the 15th, though he certainly got only about 3000 c.c. of fluid in both food and drink during that day. On the 16th, 17th, 19th, and 20th the excretion was far lower than at any other period of observation. (The amount of urine on the 17th was 1780 c.c., but the esters were not estimated.) The average figures for the esters up to February 14th (excluding the result on February 8th, which is very probably incorrect) is 2.598 grammes; for the period from February 15th to February 20th, inclusive, 1.499 grammes. Hence the restriction of fluids reduced the esters to 58 per cent. of their previous amount. If the two periods be made according to the drop in the excretion of urine it is interesting to note that the average of esters for the period from February 7th to February 15th, inclusive, is 2.410 grammes, while for that from February 16th to February 20th, inclusive, is 1.502 grammes, while the average amount of urine in the same periods is 3650 c.c. and 2290 c.c. respectively. The average amount of esters in the second period is, then, 62 per cent. of the average in the first period, while the average amount of urine in the second period is 63 per cent. of that in the first period. This correspondence between the diuresis and the amount of esters, while its exactness is probably largely accidental, is too close to allow one to overlook the fact that the two bear a decided relation to each other. Diet could have played no part in this, as absolutely the only change made in the man's regimen was in the amount of water given him. Throughout the whole series of estimations he was given

exactly the same food in constant quantities; the food consisted of milk, eggs, butter, bread, and sugar. The amount of carbohydrates in the urine is, therefore, evidently influenced to a very decided degree by the amount of urine passed and very probably, as suggested by Rosin and v. Alfthan, by the diet also. It is quite possible that excessive diuresis is sufficient to explain the result obtained by v. Alfthan in his case of diabetes insipidus, and it would certainly be necessary to demonstrate a very marked increase in order to show by this method even a probable relation between diabetes mellitus and diabetes insipidus so far as carbohydrate metabolism is concerned. If further investigation should show a moderate increase of esters in diabetes insipidus I should be very strongly inclined to attribute this increase wholly to the abnormal diuresis. The man whose case I report did not show any increase at the time of the investigation, but it would not surprise me if another series of estimations undertaken in the same case after six months or a year had passed demonstrated larger quantities of carbohydrates than those reported here, for the man was, as stated, convalescing from typhoid fever when these estimations were made. A marked tendency toward the laying on of tissue after severe acute diseases is demonstrated both by clinical observation and by exact determinations of the intake and outgo in such subjects. This man was increasing in weight and was evidently retaining nitrogen, as his food contained about 15 grammes of nitrogen while his excretion in the urine was notably more than 14 grammes in only one instance. It seems to me that he was very probably excreting less carbohydrates also than would be the case under ordinary circumstances. At any rate, this possibility is of sufficient interest to deserve investigation in other instances.

The nitrogen was estimated for a number of days coincidently with the esters for two reasons: To see whether there was the same relation between the amount of fluids taken and the nitrogen excretion that I have previously referred to; and to see whether there was any relation between the nitrogen excretion and the excretion of carbohydrates. The latter point was chiefly of interest because v. Alfthan stated that he thought that the unfermentable carbohydrates may be looked upon as derived from body protein or from glycogen—*i. e.*, that they are produced in the body. If they are derived from body protein their excretion should show some relation to the nitrogen excretion if the nitrogen intake is kept constant, as was practically the case with this man. In regard to the latter point the ratio of esters to urinary nitrogen was as follows: February 13th, 1 to 5.44; February 14th, 1 to 5.53; February 15th, 1 to 8.5; February 16th, 1 to 5.69; February 18th, 1 to 9.2; February 19th, 1 to 8.02; February 20th, 1 to 7.65. There was a general tendency for the nitrogen and the esters to rise and fall together, as most of the urinary solids tend to do in a

general way. There was not the slightest tendency, however, toward the maintenance of any fixed ratio in the excretion of the two, and so far as such an observation goes it points against the formation of the urinary carbohydrates in this case from body protein. So complex a question cannot be settled in this off-hand manner, however, and this point in the figures is not worthy of much insistence. The question of the origin of the carbohydrates will be touched upon again at the end of this paper. The nitrogen excretion shows, in general average, the same rise and fall with increase or decrease of intake of fluids that I have previously described, and I think that it is quite thoroughly established by the observations to which I have referred and by my own earlier results that excessive water ingestion increases protein metabolism—a fact which is, as I have previously insisted, of much importance in explaining the clinical results of immoderate use of fluids.

There are one or two points concerning the benzoyl-chloride method that may be worthy of mention. In the first place, it is absolutely essential to have a good preparation of benzoyl chloride—a fact which is not sufficiently insisted upon by those who have previously discussed the method. Some of the difficulties in the use of the method described by several authors were not improbably due to the use of impure benzoyl chloride. I tried in all ways that I could devise to obtain a satisfactory precipitate with what was thought to be a perfectly satisfactory preparation, but had no success in about two weeks' work. I then secured some benzoyl chloride from another source, and afterward met with absolutely no difficulty in carrying out the method. The first specimen was undoubtedly faulty, though it was not evident in what way, and I made no serious attempt to learn what was wrong. In carrying out the method one should be careful to shake the mixture gently at first in order to avoid producing an emulsion. If shaken gently for ten minutes, or thereabouts, and then more vigorously for about twenty or twenty-five minutes, the esters precipitate extremely well and can be washed readily. I found it unnecessary to shake the mixture for "at least one hour," as recommended by a number of writers. Finally, Salkowski recommended that the mixture be shaken for a half-hour and then stood aside overnight before filtering. This is, I think, unsatisfactory. I have had good flocculent precipitates become sticky and impossible of filtration after such a procedure. The esters tend to become sticky after standing even when they have been washed and placed in a closed vessel over sulphuric acid.

The figures for control estimations were introduced into the table merely to show that absolutely exact results are not obtained by the method. It has been the general experience that control estimations are likely to show variations in results as large as 10 per cent. or more.

My results show this in most instances. Two estimations were made every day after the first, the whole process being carried out separately in each case, even in precipitating the phosphates before adding the benzoyl chloride. Exactly the same amount of urine, of benzoyl chloride, and of sodium hydrate was used in each estimation, the mixtures were shaken for the same length of time, cooled in the same manner, filtered coincidently, and each was washed just to the point where the filtrate became neutral, yet the decided variations shown were not avoided. These variations are, however, not sufficient to make the method of questionable value when used only as an index and when, as in the work herein reported, small variations have no influence upon the conclusions reached.

v. Alfthan states that his results in estimating the esters in a normal subject throughout a series of twelve days showed figures varying from 1.5 grammes to 5.1 grammes. My patient showed much more constant excretion. When taking large quantities of fluid the esters varied only between 2.099 grammes and 2.897 grammes, exclusive of the wholly erratic result on February 8th. The amount fell when the fluid was reduced, but there was only slight subsequent variation, the figures ranging only between 1.768 and 1.288. Since this man was on constant diet, and there is no statement that such was the case with v. Alfthan's (normal) subject, who showed such marked variations, it seems to me extremely probable that the amount of carbohydrates in the normal urine depends largely upon the diet, and that these carbohydrates are in large part at least derived from the food rather than formed in the body. I would say again, however, that this question is still widely open.

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CONCLUSIONS BASED UPON THREE HUNDRED AND THIRTY OUTBREAKS OF INFECTIOUS DISEASES SPREAD THROUGH THE MILK-SUPPLY.

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In view of the importance of milk as an article of diet for all classes, but especially infants, invalids, and the sick and convalescent, it is perfectly natural that much attention should have been given to the study of this food-stuff, and that of late years the sanitarian and bacteriologist should have found it a profitable field for research.

Few countries until recently have deemed it necessary to do more than prevent adulteration of the milk, and some of the legislators appear to think that as long as the milk has not been skimmed or watered, and contains the standard of total solids and fats, we need not worry about the germs we eat or drink. This may be a pleasing reflection to persons who do not know that such hydra-headed diseases as scarlet fever, diphtheria, and cholera infantum have been disseminated in the milk-supply, that typhoid fever epidemics have been thus caused, and that milk may be the vehicle of the germs of tuberculosis and other infectious diseases and morbific agents.

Time will not permit me to do more than briefly point out some of the circumstances under which milk may be the cause of disease.

1. Sour milk, or milk which is on the point of turning, is very liable in infants, children, or persons with feeble digestion to produce gastric and intestinal catarrhs of an acute or chronic character. In the more acute cases, in bottle-fed children, we have the phenomena of cholera infantum. The causes of untimely acidity of the milk are improper feeding of the animals, dirty milk-pans and rooms, unclean udders and teats, and a high temperature.

Every consumer of milk has doubtless observed the presence of more or less foreign matter found at the bottom of the vessel or bottle in which it is kept; indeed, it is a matter of such common occurrence that it hardly excites our attention. If these sediments are subjected to microscopical examination we will find that they are composed of epithelial débris, hairs of the cow, organic and inorganic dust particles, bacteria, fungi, and spores of every description, and last, but not least, excrementitious matter from the cow, which adhering to the udder, or other parts of the animal, gained access to the bucket in the act of milking. Unfortunately, fully 90 per cent. of the bacteria found in

[1] Abstract of a paper read before the Section of Hygiene and Epidemiology of the International Medical Congress, Paris, August, 1900.

such specimens are fecal bacilli, which multiply with astonishing rapidity and hasten decomposition of the milk. Dr. Plaut found, as a rule, that in warm weather the so-called fresh milk delivered in the morning has already passed the period of safety and is unfit for use by young children, on account of undue germ development, and sees in this the most frequent cause of cholera infantum and the summer diarrhœas in bottle-fed children.

In April and May, 1898, Dr. E. A. de Schweinitz, of the Biochemic Laboratory of the Department of Agriculture, examined thirty-one different samples of milk from as many dairy wagons in Washington. Of these one showed only about 4000 bacteria per c.cm.; one, 2500; five others between 10,000 and 15,000; six between 30,000 and 50,000, and the remainder more than 50,000 per c.cm., in several instances running over 115,000 per c.cm. In those cases where the number of bacteria per c.cm. was small it is fair to presume that the milk was collected with considerable care; the other cases, he adds, speak for themselves.

As a matter of fact, Bitter, an authority on sanitary milk, claims that the maximum limit for milk that is fit for food is 50,000 germs per c.cm. On this basis the milk from only about thirteen out of thirty-one dairies in Washington examined by Dr. de Schweinitz was fit for food. Dr. Turner, the Dairy Inspector of the District, during the fiscal year ending July 1, 1899, examined bacteriologically 117 different samples of our market milk, and found only 52 of the 117 samples to contain less than 50,000 per c.cm.; indeed, some of the samples showed a higher number of bacteria than the sewage water of the city, which statement, he adds, "is not pleasant to ponder over."

2. Milk may be rendered unfit for use and cause sickness in children by reason of improper food of the animal, or while the animal is being treated with strong remedial agents, which may be excreted in the milk. The symptoms of poisoning from arsenic, copper, iodine, lead, mercury, tartar emetic, atropine, colchicum, croton oil, strychnine, veratrum viridis, etc., has been thus observed.

3. Milk itself may be morbific as the product of a diseased animal. Dr. Busey and myself have elsewhere pointed out that inflammatory conditions of the udder and teats, especially the condition known as garget, are doubtless responsible for a large number of cases of pseudo-diphtheria and other septic infections. The milk of animals suffering from acute specific enteritis, puerperal and other septic fevers, foot-and-mouth disease, cowpox, anthrax, pleuropneumonia, rabies, and tetanus has also been known to produce sickness in the consumer.

4. It has been shown by Ernst, of Harvard, that three out of twenty-five samples of Boston milk transmitted the germs of tuberculosis in the animals experimented upon, and Dr. Fries found that the ordinary

market milk of Copenhagen proved infectious in six out of twenty-eight rabbits, showing a corresponding degree of danger to delicate infants, and of which Dr. Busey and myself have collected a large amount of clinical evidence.

5. Milk may acquire infective properties after it leaves the udder of the animal. Numerous instances have been observed in which outbreaks of typhoid fever, scarlet fever, and diphtheria, by their sudden and explosive character, affecting families living in streets and localities supplied by the same milkman, naturally pointed to the milk-supply as a common cause. Dr. Michael Taylor, however, was the first physician (in 1857) to point out definitely that cow's milk might serve as the medium of spreading typhoid fever from a dairy where the disease prevailed. In 1867 he also showed that scarlet fever might be distributed in the same way. In 1877 Mr. Jacob traced a diphtheria epidemic at Sutton to the milk-supply, and in 1872 Macnamera traced an outbreak of cholera at Calcutta to an infected dairy. These facts could not fail to sharpen the powers of observation in others, and in consequence similar outbreaks were more frequently reported, so that Mr. E. Hart, the editor of the *British Medical Journal*, was enabled to present to the International Medical Congress held in London in 1881 the history of fifty outbreaks of typhoid fever, fifteen of scarlet fever, and seven of diphtheria, all traceable to the milk-supply. In a similar communication made before the International Medical Congress at Paris, in 1900, the writer presented his conclusions based upon the tabulated histories of 330 outbreaks of infectious diseases spread through the milk-supply; these outbreaks consist of 195 epidemics of typhoid fever, 99 epidemics of scarlet fever, and 36 epidemics of diphtheria.

It has been demonstrated by numerous bacteriologists that disease germs may not only survive, but in many instances actually proliferate, in the milk, and it is not a difficult matter to point out the many ways by which these germs gain access, especially when some of the employés are also engaged in nursing the sick, or are suffering themselves from some mild infection while continuing their duties, or are convalescent from the disease.

It is quite conceivable how animals wading in filth and sewage-polluted water may infect the udder with the germs of typhoid fever and through it the milk. We can also appreciate how infected water may convey the germs by washing the utensils or by deliberate adulterations. Infection may also take place through the agency of scrubbing-brushes, dishcloths, exposure to infected air, and the agency of flies.

Of the 195 epidemics of typhoid fever tabulated by me there is evidence in 148 of the disease having prevailed at the farm or dairy. In

sixty-seven instances the infection probably reached the milk by percolation of the germs into the well-water with which the utensils were washed; in sixteen of these the intentional dilution with water is a matter of evidence. In three instances the bacillus coli communis and the typhoid germs were demonstrated in the suspected water. In seven instances infection is attributed to the cows wading in sewage-polluted water and pastures; in twenty-four instances the dairy employés also acted as nurses; in ten instances the patients while suffering from a mild attack, or during the onset of the disease, continued their work, and those who are familiar with the personal habits of the average dairy hands will have no difficulty in surmising the manner of direct digital infection. In one instance the milk-tins were washed with the same dishcloth used among the fever patients. In two instances dairy employés were connected with the night-soil service, and in another instance the milk had been kept in a closet in the sick-room.

Of the 99 epidemics of scarlet fever the disease prevailed in sixty-eight instances, either at the dairy or milk farm. In six instances persons connected with the dairy either lodged in or had visited infected houses. In two instances the infection was conveyed by means of infected bottles or milk cans left in scarlet-fever houses. In seventeen instances the infection was conveyed by persons connected with the milk business while suffering or recovering from the disease, and in at least ten instances by persons who acted as nurses while handling the milk. In three instances the milk had been stored in or close by the sick-room. In one instance the cans had been wiped with an infected cloth. In nineteen instances the infection was attributed to disease of the milk cows, such as puerperal fever and inflammation of the udder and teats; but these outbreaks were probably not genuine scarlet fever, but a so-called streptococcus or staphylococcus infection, the symptoms of which closely resemble those of scarlet fever.

Of the 36 outbreaks of diphtheria tabulated there is evidence that the disease prevailed at the dairy or farm in thirteen instances. In three instances the employés continued to handle the milk while suffering themselves from the disease. In twelve instances the disease is attributed directly to the cows having inflammatory conditions of the teats and udders. These instances, however, may be regarded as typical examples of streptococcus and staphylococcus infection, giving rise to a form of follicular tonsillitis or pseudodiphtheria, often difficult to distinguish clinically from true diphtheria or scarlet fever.

It is interesting to note that of the 330 epidemics analyzed by me 243 have been recorded by English authors, 52 by American, 14 by German, 11 by Scandinavian, and 5 each by French and Australian writers. This is probably due to the fact that the English and Ameri-

cans usually consume raw milk, while on the Continent the milk is rarely used without being boiled.

A review of the evidence in milk contamination both in this country and Europe shows that the laws which have been enacted to protect the public deal largely with the prevention of milk sophistication, and even in this respect have fallen short of their aim; indeed, it is doubtful whether legislation in matters of this kind is as effective as public education. The importance of a pure milk-supply was recognized as early as 1878 in connection with some of the milk-cure establishments in Germany. The system then originated has been improved by time and experience and lately introduced into several of our larger cities. Such a sanitary dairy was inaugurated in Washington in 1897. The farm and herd, the employés and general manipulation of the milk, are under the supervision of a committee appointed by the medical society and subject to frequent, unannounced inspection. As a result of strict cleanliness and attention to details the average number of bacteria per cubic centimetre during the year 1899 was 6485 in the raw milk against 52,000 per c.cm. as found in the market milk; but it must be remembered that this is only one dairy, whereas at the close of the fiscal year of 1899 there were in force 152 permits for the maintenance of dairy farms in the District, 390 for the maintenance of dairies, and 600 for the importation of milk; hence there is ample room for the establishment of sanitary dairies, which appear to offer by trade competition the best solution of an important problem. Those who are familiar with the surroundings of our milk farms and the habits of the average dairy employés need no arguments for the necessity of sanitary reforms and additional legislation upon the subject. To indicate the value of milk inspection to the health of the community, I may say that in 1893 there were not less than 451 deaths from diarrhœal diseases of children under five years, while in 1898, when the inspections extended over only about one-third of the source of our milk-supply, the number of deaths from the same cause was but 231, showing a decrease of about 50 per cent.[1]

The importance and value of this work, according to Dr. Woodward, was also demonstrated during the past year by the discovery of an outbreak of scarlet fever due to the presence of an undiagnosed case of this disease on one of the farms which supplied milk throughout the city. Before this outbreak, however, was checked the number of cases traced to this milk-supply amounted to sixty-five. The ability of the Health Department to check the outbreak was due entirely to the law regulating the sale of milk enacted in 1895, upon the recommendation of the Medical Society of the District of Columbia.

[1] Report of the Health Officer of the District of Columbia, 1899.

LARYNGEAL HEMORRHAGE FROM AN APPARENTLY NORMAL LARYNX.

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The spitting of pure blood or other expectoration streaked with blood is to be considered not as a disease but as a symptom to be found in many and various pathological conditions. Yet this symptom, when unprovoked, impresses the patient in whom it occurs with the idea that he is suffering from tubercular disease of the lungs, and in a large majority of cases this impression is correct. It is, however, fortunate that hemorrhage from the larynx, leading to the expectoration of either pure blood or blood-streaked mucus does sometimes occur in curable cases, but it is only exceptionally that the bleeding can be traced to an otherwise normal larynx. In tuberculosis, in syphilis, in cancer, and other diseases which lead to ulceration we frequently find corrosion of bloodvessels which may cause serious if not fatal hemorrhage. In hemorrhagic laryngitis there is frequently more or less oozing of blood, though never to any great amount; and the lodgement of sharp-pointed foreign bodies or other traumatism, such as fracture of one of the laryngeal cartilages or the hyoid bone, may be productive of a rather severe amount of hemorrhage. It must be conceded, however, that cases of laryngeal bleeding, unprovoked by some local cause, are exceptionally rare, and in a rather careful search through the literature since 1890 I have been able to find only six cases. These few cases I give in abstract.

No. 1. Terras[1] reported a case of bleeding from the larynx occurring in a girl, aged twenty years, who had not yet menstruated. With the laryngoscope an eroded vessel was found close to the base of the right arytenoid cartilage.

No. 2. Charles Geraert[2] reports a case of laryngeal hemorrhage occurring during an attack of hoarseness. The bleeding-point was located at the juncture of the middle and anterior third of the left vocal cord.

No. 3. Lubet-Barbon[3] reports a case in which there was marked oozing of blood from the right vocal cord, in a patient who suffered from cirrhosis of the liver.

No. 4. Von Geyer[4] reports the case of a woman, aged forty years, who had been hawking clear fluid blood for the past seven weeks.

[1] Meeting of the Société Francaise de Laryngologie, etc., May, 1895.
[2] La Belgique Méd., 1895, No. 42.
[3] Journal of Laryngology, Rhinology, and Otology, 1898, p. 149. Abstract.
[4] München. med. Wochenschrift, April, 1898.

Examination of the larynx showed a bleeding bluish-red tumor about the size of a currant, just below the petiolus of the epiglottis. This was removed by thyrotomy, but very shortly afterward returned. It was again removed, this time interlaryngeally, and a bleeding vessel was found underneath the tumor which was now seen to be simply a small clot of blood.

No. 5. Howard S. Straight[1] reports two cases of laryngeal hemorrhage.

Case I.—A man, aged thirty-seven years, had had repeated hemorrhages from the throat for fourteen years; at first they occurred very infrequently, but during the last seven years they had been coming on at intervals of from a few weeks to a few months. He had never suffered from any catarrhal trouble except a slight hypertrophic rhinitis, and a general examination revealed nothing abnormal. The blood-vessels, however, of the larynx, epiglottis, and base of the tongue were seen to be considerably engorged. The first examination did not discover the actual point of bleeding, though made within a few hours after he had expectorated blood. The bleeding came on after singing, which exercise also increased the engorgement of the laryngeal blood-vessels. It was thought that the bleeding most surely came from the larynx, though the actual point was not discovered.

Case II.—A man, aged thirty-five years, had expectorated blood at widely varying intervals for the last sixteen years. Up to the time of examination the bleeding was never profuse, and the only abnormality which could be detected either locally or generally was a bleeding-point consisting of a minute ruptured bloodvessel, situated in the anterior third of the left vocal cord. The bleeding kept up in spite of all treatment, always coming from the cords without any apparent cause, and the man finally died from profuse hemorrhage of the larynx.

In glancing over the cases it will be seen that No. 1 was probably a case of spurious menstruation; that in No. 2 there may have been more or less marked laryngitis, giving rise to the hoarseness complained of; and in No. 3 there was cirrhosis of the liver, probably giving rise to more or less congestion of the veins all over the body. In the other three cases no cause for the bleeding could be detected.

Submucous hemorrhages of the larynx, either resulting from marked active congestion or inflammation, or from overuse of the voice or from severe coughing, are not very uncommon pathological conditions, numerous cases of these having been reported; but as seen by the few cases which I have been able to find active bleeding unaccompanied by destructive disease of the larynx is of very rare occurrence. I desire to put on record the following case, which I believe is of interest because of its rarity.

Mr. D., aged thirty-six years, has been a healthy man all his life. He was somewhat addicted to alcohol, though never excessively so.

[1] Journal of Laryngology, Rhinology, and Otology, 1899, p. 91.

He came to me first on August 10, 1899, spitting up a small quantity of bright-red blood every few minutes. There was no cough accompanying the expectoration. He simply, with a very slight hawk, was able to eject the blood or bloody mucus from his mouth. On the morning of his visit, while chewing a toothpick (to which habit he was more or less inclined) a piece lodged in his throat, causing considerable though temporary cough. An hour or so later he began to split blood. Naturally his mind turned with dread to the thought of consumption, and he came chiefly to find out whether he was a sufferer from that disease. His lungs, which were examined by Dr. H. C. Wood, Jr., were found to be in perfect condition. Besides, there was no loss of weight, no chronic cough, nor any other reason outside of the bloody expectoration to suspect tubercular disease. Local examination showed the nose to be normal, except for a small septal ridge on the left side, and no blood could be detected by anterior rhinoscopy. The vault of the pharynx, however, was seen to be flecked with small blood clots, likewise the posterior pharyngeal wall and the lingual tonsil, the latter being somewhat enlarged. With the laryngoscope the arytenoid cartilages and the intervening fold of mucous membrane were seen to be red and covered with fresh blood, which was evidently coming from the larynx. The vocal cords and anterior wall of the trachea were also covered with blood. The actual bleeding spot could not be determined. Supposing at that time the case to be one of traumatism, caused by the lodgement of a portion of the toothpick, I gave a favorable prognosis, and ordered potassium bromide and fluid extract of ergot. On the following afternoon, when I saw him, the bleeding had stopped, and there was no sign of blood in either pharynx or larynx, except a small red point at the anterior end of the left vocal cord, possibly the source of the bleeding. Careful re-examination of his lungs and heart gave negative results, though he complained somewhat of palpitation. I ordered tincture of aconite in small doses for a while, and did not see him again until February 13, 1901. He then came back to me with practically the same symptoms as at his previous visit, except that at this time the bleeding had started from apparently no cause. He had given up the habit of chewing toothpicks, and was in perfect health up to the time when the desire to expectorate showed the hemorrhage to have started. He had not overtaxed his voice, nor had he exerted himself in any manner sufficiently to act as an exciting cause of the bleeding. During the summer of 1900, while I was out of town, he had had another attack of bleeding, which had ceased spontaneously. The patient during the last two years had not lost weight; had not suffered from cough; but had had occasional attacks of dyspepsia. On examination the nasal fossæ were found to be free from blood, likewise the vault of the choanæ. No blood clot or other sign of bleeding could be detected in either the fauces or oropharynx, but a number of clots were seen on the epiglottis and the vocal cords were covered with bright red blood. A thin streak of blood was noticed running down the anterior wall of the trachea.

I consulted with Dr. Freeman, who believed that the hemorrhage came from the larynx, and almost surely from a spot just below the anterior commissure. He called my attention to the condition of marked dilatation of all the veins of the gums, of the pharynx, and of the larynx. The bleeding was temporarily controlled by local applica-

tions of suprarenal extract, though it returned again in very slight quantity three or four hours later. Another careful examination by Dr. H. C. Wood, Jr., to detect any possible disease in the other organs of his body gave negative results, except for a marked oxaluria. For this latter condition he was put on nitrohydrochloric acid, and the oxalates rapidly disappeared from his urine. When I saw him on February 22d, nine days after the hemorrhage, the engorgement of the veins of the mucous membranes of his throat and larynx had considerably diminished, and he had had no bleeding since the day of his visit.

In looking over this case for any assignable cause for the hemorrhage I can find nothing at all which seems to me conclusive. There was undoubtedly an abnormal condition of the bloodvessels—"a predisposing cause;" but in this last attack, as also in the one occurring when I was out of town, no direct cause could be detected. Also, it seems hard to believe that the dilatation of the veins was due to his condition of oxaluria, though the coincident decrease in the size of the vessels following decrease in the amount of oxalates in the urine was somewhat suggestive. In such cases as that reported by Lubet-Barbon, No. 3, where there exists a marked pathological condition like cirrhosis of the liver, giving rise to dilatation of the veins all over the body, it is easily conceivable how some slight unappreciable trauma may cause rupture of the veins; but in such a case as reported by Straight, where from apparently no cause whatsoever a man began to expectorate blood, which in spite of all treatment kept up until death finally intervened, a direct result of hemorrhage, we as diagnosticians must acknowledge defeat.

Of course, it is not inconceivable that in the case from my own experience there may exist some slight tubercular focus in the lung; unprogressive but sufficiently active to cause the rupture of a small bloodvessel; but the probability of such a condition seems for the following reasons infinite in its minuteness:

1. No recognizable symptoms of tubercular disease could be detected.
2. The blood, though apparent in the trachea, was evidently running downward and not upward, existing as a small narrow streak on its anterior wall.
3. The blood was expectorated easily, without cough.
4. The point of bleeding was thought to have been found just below the anterior commissure in the last attack, and on the anterior end of the left vocal cord at his first visit.
5. The temporary cessation of bleeding following the local application of suprarenal.

Of course, if at a later date tubercular disease develops in this case it would point very strongly toward an explainable etiology, though I cannot admit that it would be a positive indication of present tubercular trouble.

BLASTOMYCETIC DERMATITIS OF THE GLUTEAL REGION.[1]

By Frederick G. Harris, M.D.,
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The history of this case is somewhat incomplete on account of the patient's mental condition, but so far as obtainable it is as follows:

Family History. The patient is a woman, aged seventy-eight years. Both her father and husband died from unknown causes. Her mother died of phthisis. She has had nine children; one daughter has phthisis, one son is living and well, one child died in infancy, two children died of yellow fever, and four are dead of causes unknown to the patient.

Past History. The patient was born in Germany; lived in New Orleans for forty years, during which time she had yellow fever. She never had any other illnesses, denies venereal infection, and there are no stigmata present. She has lived in Chicago for the past ten years.

Present History. Patient's present trouble commenced nearly four years ago, when she noticed a pimple on her left hip, which became a roughened area of intense itching, and later, on account of scratching, became apparently denuded of epithelium. The growth gradually increased in size and the itching persisted, but of much less intensity.

She was admitted to the Cook County Hospital as a case of syphilitic ulcer. A piece of the growth was excised and on microscopical examination a diagnosis of epithelioma was made and the patient transferred to the surgical service of Dr. Charles Davison, who has kindly permitted me to report the case.

The growth is on the upper posterior part of the left gluteal region; it is oval in outline, measuring 11 cm. long by about 6 cm. wide. The entire growth is movable on the underlying tissues. The border is quite hard, elevated about 8 mm., and in places the growth can be felt extending out into the surrounding skin. From the inner side of the border papillomatous growths overhang the floor; they are of various sizes, the largest measuring 2 cm. long. Most of these villous-like projections bear secondary and tertiary growths of a smaller size, the whole being covered with epithelium, giving them a bluish-white color similar to venereal warts. At no point on the border is there an area of ulceration indicating an extension of the process (Fig. 1).

The floor is covered with small fungoid epithelial growths similar to those projecting inward from the border. These papillæ vary in size from a small elevation to 0.5 cm. in height. Here and there among these elevations are darker red areas of ulceration, the whole floor being more or less covered with a hemorrhagic exudate. Extending in a diagonal direction nearly across the growth is a band of uninvolved skin about 2 cm. wide.

There are no secondary growths near, or, in fact, on any part of the body; but on the bridge of the nose is a hard, non-ulcerated, sessile tumor about the size of a hazel-nut. It is freely movable on the bone,

[1] Read before the Chicago Pathological Society.

but the skin is closely attached to it. On the surface are seen several dilated bloodvessels. This little tumor is painless. It has been there for the past twenty years, and the patient thinks it is due to the irritation of a pair of brass spectacles. It bears no resemblance whatever to the growth on the hip, and microscopical examination shows it to be an endothelioma.

The patient complains only of the itching, which is much less intense than when the growth started, but which at times interferes with walking; there has been no actual pain at any time. The neighboring lymph glands are but slightly enlarged.

Pieces of the hip lesion were fixed in 4 per cent. aqueous formalin, dehydrated in alcohol, cleared in benzole and cedarwood oil, embedded in paraffin, and stained by various methods. The best results were

FIG. 1.

obtained with eosin and polychrome methylene-blue, but hæmatoxylin, followed by Van Gieson's stain, gave good results, as did also Weigert's elastic-tissue stain. Sections stained for tubercle bacilli were negative, as were those stained by Gram's method.

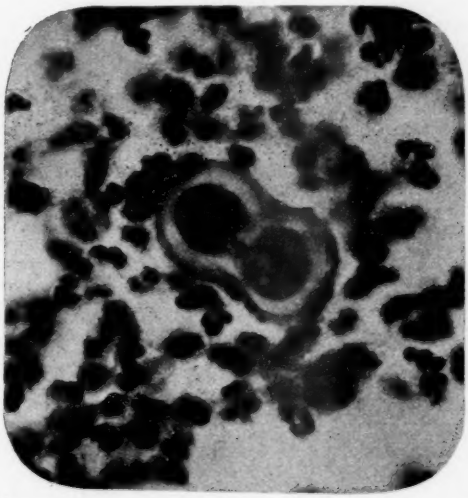
Microscopical Appearance. Some distance outside of the growth the skin is normal, but on approaching the affected area the interpapillary processes of the rete mucosum are seen to extend deeper into the corium, and instead of being regular in form they often have knob-like projections from their sides, as if they were budding, and at their lower extremity they often bifurcate to enclose a mass of corium. This irregularity increases the nearer we approach the growth. At the edge of the growth we see the papillomatous outgrowths extending over the floor. They are seen to be formed by an extension of the

corium, covered on both surfaces with epithelium, which extends into the interior in irregular projections.

In this core, so to speak, are irregular isolated masses of epithelium, many of which are hollow and contain corium infiltrated with round and plasma cells and leucocytes. Occasionally in these islands of epithelium we find the miliary abscesses which are so characteristic of this disease.

The floor of the growth shows villous projections similar to those described as growing inward from the border. From the surface of the floor there is a marked hyperplasia of the rete mucosum, which dips down into the corium in coral-like projections, branching in different directions or subdividing to enclose masses of the corium. Sometimes the cells in the centre of these epithelial down-growths have

FIG. 2.



Budding form of blastomycetic organism. (BAUSCH and LOMB, 1/12.)

become cornified and taken on a concentric arrangement simulating the pearls of epithelioma.

In other places are seen miliary abscesses, composed mostly of collections of polynuclear leucocytes, desquamated epithelial cells, more or less granular material, an occasional giant cell, and the specific organism. These abscesses are surrounded by flattened epithelial cells, the prickles of the outer layers being well preserved. The abscesses are most numerous deep in the corium, where the organisms and giant cells are also more common. The giant cells are of the tuberculous type; they are found more abundantly in the areas of round-cell infiltration which are present here and there, and especially where a miliary abscess has ruptured; once in a while a giant cell is seen containing the blastomycetic organism (Fig. 2).

The organism is the typical double-contoured circular or oval body having a mass of deeply staining, granular protoplasm, which is usually eccentrically placed, often containing one or more vacuoles. The organisms vary much in size and are found in groups of two or more, usually in the different stages of budding. They are not so numerous in this case as in some of those previously reported. They show a tendency to occur in the periphery of the abscesses or free in the corium where an abscess has ruptured, and are often surrounded by a granular material which takes the eosin stain. I have been unable to find any organisms free in the rete or in the necrotic material covering the ulcerated areas.

The corium is well preserved and very vascular; the entire tissue is more or less œdematous and shows a marked infiltration with leucocytes, which while most numerous in the miliary abscesses are also seen in great numbers between the cells of the epithelium, seemingly working their way toward the surface. There are vast numbers of polynuclear eosinophiles and plasma cells in the corium; mast cells are also not uncommon.

The appendages of the skin, hair follicles, and glands have entirely disappeared.

Unfortunately there were no cultures made from this case.

The treatment consisted of complete excision of the affected area and the sliding of cutaneous flaps to cover the defect. With the exception of some sloughing of the flaps and the development of a pleurisy with effusion, the patient has made a satisfactory recovery, and there is no evidence of recurrence.

SUBINVOLUTION OF THE UTERUS: THREE SUGGESTIVE CASES.

By L. W. Atlee, M.D.,
of Philadelphia.

Some apology may seem to be due for a paper on so familiar a subject, but one will search and find but few articles in medical journals and society reports devoted to gynecological subjects which are not of a surgical nature; very few, indeed, on the therapeutic use of medicines. Gynecology, it is true, is largely surgical, and without surgery would be relegated to its position of nearly half a century ago. "That the pursuit and report of surgical procedures are in many ways more satisfactory than the investigations of the virtues of medical remedies—more satisfactory because of the brilliancy of execution, the certainty of results, and a higher remuneration—we all appreciate." A satirist has defined therapeutics to be the art of introducing a medicine of which we know little into a body of which we know still less. *Ars medica tota est in observationibus.* "One of the most elementary requirements of science is the power of distinguishing between real and merely apparent causes. . . . It is indeed a power most rare among therapeutists as well as most difficult to exercise, so strong is the ten-

dency of human nature to take to itself the credit of all the good that arises under the operations of natural laws.

The tendency of the modern text-books to omit to describe old and well-established successful methods of treatment simply because they are not new, and thus to limit themselves to the newest methods only, cannot but result to the coming medical man in a certain loss of his usefulness and increase of his power to do harm. Library gynecologists may be all very well, yet "there are many who are getting their first personal experience in this new decade who readily accept their teachings as indisputable doctrine, promulgated *ex cathedra* for their guidance. Indeed, there is such a disposition in these days of startling innovation to fall in with the latest drift of thought without sufficient test of its claims that not infrequently valuable methods of practice are too easily allowed to be discarded for the sake of the new love, which often proves to be fickle and unreliable."

This neglect of the old methods is brought about apparently not so much by their having proved themselves valueless, but by the fear of the writers that they themselves may not be considered quite "up to date" and *fin de siècle*, the result being that the old methods are entirely ignored or are relegated to such an inconspicuous place that they appear only as secondary to the latest and practically untried forms of treatment. The latter are freely quoted from, and especially the names of Germans who hold the most advanced views and are swayed by the least surgical morals.

In the words of Senn, "The *furor operativous* has been carried too far in the present time in this department of surgery as well as in nearly all others. . . . A remunerative fee or the fear that the patient will get into the hands of his competitors often deadens his sense of moral obligation toward his patient when he renders his final judgment concerning the propriety of an operation."[1]

By the term subinvolution we mean the condition which results from imperfect involution of the uterus after labor, abortion, or miscarriage. This form of hypertrophy of the womb, Courty tells us, "is pathological only because of its permanence, but physiological in its origin." The importance of this condition and its power to produce harm cannot be overestimated, for Thomas, of New York, declares: "Arrest of involution of the puerperal uterus is an occurrence of very great frequency. It constitutes the chief cause of all chronic uterine disorders, and for this reason its importance cannot be overestimated."

Mrs. C., aged twenty-three years, a well-nourished woman, rather anæmic; first seen nine weeks after the birth of first child. Had been attended in labor by a physician. I learned from the nurse, who had been recalled again to take care of her while confined in bed, that

[1] Pathology and Treatment of Tumors.

immediately after the child was expelled the woman had an attack of eclampsia, and after this she did not regain consciousness until the following day. In reply to my questions as to what the attending physician had done at the onset of the convulsion, she said, "He jumped up and ran off to the nearest drug-store to telephone for assistance," and later the consulting physician had removed the placenta; there had been but little loss of blood. She suckled the child. The woman had got up on the eighth day and attended to her housework, but feeling weak and easily fatigued. There was a constant sacral and hypogastric uneasiness amounting in the evening to pain. She also had a profuse leucorrhœa, the discharge at times being streaked with blood.

Some three days before this visit she found herself unable to extend her legs without causing severe pain in the iliac region. She then took to her bed. There was a slight rise of temperature; the tongue was clear and the appetite excellent. Lying on her back she could extend her legs without pain; it was only on trying to stand erect that the pain was brought on. Examination revealed the fundus uteri slightly above the symphysis pubis and tender on pressure from the abdominal walls; there was no tenderness elicited by pressure at the sides of the uterus in the ovarian and tubal regions. Vaginal touch showed the external os patulous, and pressure on the body of the uterus at all points attainable through the vagina by the finger showed tenderness.

Having thus a perfectly plain case of subinvolution of the womb following labor and accompanied by endometritis, the following treatment was resorted to, which has given reason to be well satisfied with its results in many other cases of this nature:

First, to produce daily evacuation of the bowels she was given a drachm of sulphate of magnesia half an hour before breakfast. It has been found best to give this to these cases in a solution with aqua menthæ piperitæ, 1 drachm to half an ounce, to be taken in a half-glassful of water. If told to take a teaspoonful of salts it does not have the same mental effect, which no one of experience despises; also 100 one-grain Bonjean's ergotin pills were ordered, one of which was to be taken an hour after meals. The only topical application used was one gallon of water at 110° F., twice a day, in the dorsal position, with the hips well elevated. She was told to eat plenty of good, wholesome food and remain in bed as long as it was painful to stand erect.

Two weeks after this she reported at my office, the pain and soreness having disappeared; she had been out of bed for five days. The first ten days after getting up the leucorrhœal discharge had recommenced, but had now entirely ceased. Examination per vaginam showed the patulous condition of the os to have passed away; the uterus was still enlarged, but not tender on pressure. She was advised to continue the ergotin and use one douche a day, and a ferruginous tonic was ordered in addition (ferri et quiniæ citratis cum strychniæ, gr. 10, in vini xerici, ½ ounce, a. c., t. i. d.). When seen a month

after this visit she was perfectly well. On this occasion the child needed the attention.

Mrs. H., aged thirty-two years, a large, robust woman, weighing some 200 pounds, came complaining of excessive menstrual flow for the past week and of leucorrhœa previously. During part of this time she had been travelling from her home in Wisconsin. About five weeks ago she had an abortion performed by her attending physician at her home. She had lost considerable blood at this time. She knew nothing as to whether the whole contents of the uterus had been expelled or not. Her general health was excellent, tongue clear, and appetite good, but she complained of a feeling of fulness and sense of weight in the pelvis, with slight pain at times in the left ovarian region. Examination per vaginam with the finger showed the os externum very patulous, large, and soft, and directed toward the hollow of the sacrum. The uterus was as large as the third month of pregnancy and anteverted, the fundus being tender on pressure in the anterior vaginal fornix, where it was easily delineated.

This woman did not want to be laid up; she was on a pleasure tour and desired to leave immediately for the New Jersey coast to enjoy the sea air and baths. What she desired was some form of treatment that would permit of her doing this. She was advised to keep on her back as much as possible, to use the hot vaginal douches once a day, and internally to begin with a single dose of two grains of ergotin, then every four hours one grain was to be taken until the bleeding ceased; then she was to finish her box of pills (100), taking one grain one hour after each meal. The bowels were to be freely moved daily by saline laxatives.

A letter was received four weeks after her visit reporting her as feeling perfectly well; all the pelvic symptoms had disappeared; the leucorrhœa ceased after taking the ergotin and douches for two weeks. She had continued the use of both until the date of the letter and desired to know if a continuance of the treatment was necessary. She was instructed to wait until after the next menses and report again as to the amount and continuance, also should the leucorrhœa recommence afterward. In due time she wrote that the menses had been entirely normal and no discharge followed.

Mrs. Fitz——, aged thirty-eight years, a large, stout woman who had borne twelve children. She sent her husband for me owing to profuse menstrual flow, which had caused her great anxiety. Nine weeks previously she had been confined with a full-term, stillborn child, which she said was perfect in every way. During the first stage of labor she had lost a good deal of blood, and her accoucheur had told her the "after-birth was first." The labor otherwise was natural and short. She felt well enough until she got up and resumed her household duties, when she began to have a profuse leucorrhœal discharge, a feeling of dragging in the pelvis, frequent and painful micturition during the day, and a general tired feeling and disinclination to move. There was no sacral pain or headache, but she was costive, needing laxatives to have any movement from the bowels. She was anæmic. The tongue was clear and she had no fever. Digital examination per vaginam showed an old, extensive perineal rupture; the uterus was low down, close to what should have been the perineum; it was large

and soft and slightly tender when palpated between the vaginal finger and abdominal hand. The os was open, soft, and patulous, the whole vaginal portion being enlarged and elongated.

She was advised to remain in bed until the bleeding stopped and given one grain of ergotin every four hours until it did so. After this she was to use one grain of ergotin three times a day for one month. After the menstrual period was over she was to use twice a day the hot vaginal douche also until the next menstrual period, and then after the period to report her condition. A large rubber ring-pessary was introduced, which kept the uterus in fairly good position. She came to the office at the time specified and said she was very comfortable; all the symptoms had been relieved and the menstrual period just past had been quite normal. The uterus was much reduced in size and no longer tender on pressure, and the os was well closed; the leucorrhœa had ceased for some time.

To Sir James Y. Simpson we owe the first scientific explanation of the condition known now as subinvolution, as previous to his paper published in the *Edinburgh Monthly Journal of Medical Science* for August, 1852, the enlarged uterus had been regarded as a form of metritis and its treatment had been most unsatisfactory. This article was embodied in the posthumous volume of his writings. In it he tells us: "The enormous increase which occurs in the parietes of the uterus during the nine months of pregnancy has long attracted the attention of professional observers. It is a kind of physiological hypertrophy, unequalled either in regard to its magnitude or its rapidity in any other organ in the adult human body; for during the forty weeks of uterogestation the uterus enlarges from nearly three inches in length and one and three-quarters inches in breadth, to twelve or fifteen inches in length and nine or ten inches in breadth. It increases from about two ounces in weight to twenty-five or thirty ounces. The cavity of the uterus before impregnation is less than one cubic inch, while at the full term of pregnancy it is extended to above 400 cubic inches; and the surface of the organ increases from about five or six square inches to nearly 350 square inches. Before impregnation the cavity of the uterus would not hold above a drachm or two of fluid; at the ninth month of uterogestation its contents usually weigh from 120 to 150 ounces.

"The rapidity, however, with which the uterus diminishes in size after delivery is, perhaps, still more marvellous than the rapidity with which it increases in size after impregnation. While the human uterus takes forty weeks to attain the dimensions pertaining to the fully developed state of pregnancy, it requires, on the contrary, from four to eight weeks only to decrease from the extreme size of the organ peculiar to pregnancy down to the small size peculiar to the same organ in its unimpregnated condition.

"But in the vital mechanism of the involution or reduction of the uterus after delivery various pathological derangements are liable

from time to time to occur. This, like every other process in the animal economy, is apt, for example, to fail either in the way of defect or excess. Some years ago I endeavored to point out to my professional brethren that occasionally, as one of the derangements in this mechanism of involution, the uterus is morbidly slow in regaining its original dimensions; its involution becomes impeded or arrested, and the organ is in consequence liable to be found, weeks or even months after parturition, still so large and unreduced as at first to be readily mistaken for a tumor of the uterus or ovary. I described this peculiar condition of the puerperal uterus under the name of 'morbid permanence of the state of puerperal hypertrophy.' . . . Retarded involution or retarded reduction of the uterus after delivery is not infrequent in its less marked degrees, especially when inflammatory or febrile action supervenes and interferes with the phenomena of the puerperal state. It is often, for example, observable both during life and after death in women who are the subjects of puerperal fever, pelvic cellulitis, and phlegmasia dolens. In lesser though sufficiently marked degrees it often persists for many long months, or even years, after parturition, particularly when combined, as I have frequently found it, with acute flexion or retroflexion of the fundus uteri or with the state of prolapsus." In the treatment of these cases he used "leeches and antiphlogistic measures."

In 1856 West published his *Lectures on the Diseases of Women*, and in Chapter VI., entitled "Uterine Disease from Interrupted Puerperal Changes," he says: "One result of inflammation succeeding to miscarriage or delivery is to check that process of involution by which the womb ought to be restored in a few weeks to the size and condition which it presented before pregnancy began. . . . The increased size of the uterus, too, is not due simply to its natural contractions being arrested, nor to the unnatural afflux of blood toward it, nor to the effusion of the products of inflammation into its substance, though possibly all of these causes may in various degrees contribute to it, but is in a great measure owing to the mere suppression of those changes which ought to occur after delivery, . . . and the organ remains, long after all active mischief has passed away, increased in size and at the same time composed of a tissue inapt for all the physiological processes of conception, pregnancy, and childbearing. . . . After inflammation has passed away the womb is left in such a condition as to render the repair of the damaged organ both unlikely to occur and slow to be accomplished, and it is peculiarly liable to be aggravated during the fluctuations of circulation and alternations of activity and repose to which the female sexual system is liable . . . A degree of inflammation far short of what is requisite to endanger life or to occasion much suffering may yet interpose a great obstacle to the

complete involution of the womb. . . . The great importance of this condition is due less to the symptoms to which it gives rise, so long as it remains uncomplicated, than to the circumstance that complications of some kind or other are very apt to occur; that the heavy uterus is very likely to become prolapsed, or the enlarged uterus to become the seat of permanent congestion or to be attacked by chronic inflammation. A sense of weight in the pelvis, more or less bearing down, and a disposition to excessive or over-frequent menstruation are, however, seldom absent when any considerable uterine enlargement exists, and in general the size of the womb and the severity of the symptoms are in direct proportion to each other."

He gives the history and condition of an illustrative case that is so typical of the condition under discussion and so frequently encountered by the general practitioner that we will transcribe it:

A woman, aged thirty-one years, who had been married twelve years and had given birth to five children at term and had miscarried three times. Her last abortion occurred at the third month, six weeks before her admission into the hospital. Since this abortion she had suffered from shooting pains at the lower part of the back and in the abdomen, from bearing-down pain at every effort at defecation, and from a constant sanguineous discharge by which she had been much exhausted. The medical men under whose care she had been told her that she had a tumor of the womb. On examination the uterus was found low down, completely retroverted, the os uteri being directed forward and only a short distance from the vulva. Almost immediately behind the os the uterus swelled out into a globular tumor of the size of a small apple, elastic to the touch. The canal of the cervix was open so as to admit the finger without difficulty. On introducing the uterine sound it passed, with the concavity turned backward, for a distance of five and three-quarter inches, and on turning round the tumor previously distinguished entirely disappeared. The patient was kept quiet in bed, was allowed a little wine and meat diet, and the hemorrhage ceased and the canal of the cervix contracted under the use of the ergot of rye, though no sensible uterine action was excited by the remedy.

This case was greatly benefited by the rest, tonics, and ergot, but the retroversion still existed when she was examined three months later, and the uterus was still enlarged; the treatment was continued and cold douches given. She was seen again three years later, during which time she had miscarried several times at an early period of pregnancy. "Her uterus was still retroverted, and the abortions were probably due to the organ having been turned down by adhesions in this unnatural position. It had, however, greatly diminished in size and was now little, if at all, larger than the healthy womb."

The most common causes for subinvolution are too early rising after childbirth or miscarriage, lacerations of the cervix or perineum, and septic infection resulting in the various inflammations of the pelvic contents; and to these may also be added the displacements of the

uterus due to the laxity of the supporting structures from the same condition of subinvolution in them. This condition of displacement acts more as a secondary cause, keeping up the already existing enlargement of the uterus.

Courty tells us in his splendid work on *Diseases of the Uterus* that "These sufferers attribute the unusual sensations first experienced to the weakness following labor, and wait patiently for them to disappear, but several months pass without bringing any change in their state; they commence to be astonished and disappointed not to find themselves relieved. After the child is weaned, if they had been able to nurse the child (which is unusual), they find their menses do not appear regularly or are profuse and painful. A leucorrhœa, more or less abundant, is often added to these symptoms. In the end these sufferers find themselves in a bad state of health, hard to endure. Tonics and sedatives give them some relief and make them hopeful of being cured, but the relief is incomplete. Not only does it require time to bring about a cure, but it also requires a special treatment."

In the great majority of cases of subinvolution of the uterus the patients will come to the practitioner complaining of the symptoms of the endometritis accompanying the condition and perhaps causative of it. She has backache, pelvic pains, dragging sensations about the loins, "bearing-down" pains, leucorrhœa, menstrual disorder tending to excessive flow, throbbing sensations about the uterus, general feeling of despondency, malaise, and weakness; irritability about the bladder and rectum. All these rational signs pointing to the uterus as the probable delinquent organ, a physical exploration is made and furnishes the following results: The uterus is usually discovered to be in the position of descent, retroflexion, or anteflexion; it is voluminous, tender to the touch, and evidently engorged with blood; from the cervical canal a leucorrhœal matter flows; the probe carried to the fundus finds it tender and creates the flow of a little blood; the cervix is large, soft, and patulous, and in the late stages in a state of cystic degeneration.

Of the treatment of this condition Thomas writes: "I do not hesitate to declare that he who fully masters it and thoroughly appreciates its frequency and influence will possess a key to the management of numerous cases which would in vain be sought for elsewhere."

The general treatment of these cases is of the utmost importance as to such means as are used for the production of red blood being instituted; iron and tonics are invaluable combined with a liberal diet with plenty of fresh meats, easily digested; but to digest and assimilate "beef and iron" much fresh air is necessary, and this is not easily attainable by those to whom movement is irksome. We are so often given such very impracticable details of treatment for people of the less easy classes—and these make up the great mass of the ordinary

medical man's clientèle (to whom these few remarks are addressed), for his patients cannot go off on delightful jaunts like

"Mrs. Gill who is very ill,
And nothing will relieve her
But to see the Tuileries
And waddle through the Louvre!"

The people who must stay at home and care for the children and perform the usual housewifely duties, and who are not sick enough to be in bed, what are they to do? or have they no right to be sick? At best we can advise these poorer sufferers to go out at least once a day with as little fatigue as they can to themselves. I have found the time-honored prescription of drinking three glasses of warm, fresh milk every day, and, as advised by Bulkley, one hour before meals, to be a great help in restoring lost tone; also, these people can make use of the warm salt bath, which has been effective to this end in my observations.

Simpson advised counter-irritation to the abdomen and sacrum; for this he used croton oil, antimonial ointment, fly-blisters, and tincture of iodine. This was supposed to help in the absorption of the enlarged uterus, and at the same time mercurial ointment, or ointment of iodide of lead, or of bromide of potassium, and such like remedies, were applied to the vaginal portion of the uterus. Internally he used iodide or bromide of potassium for their absorptive effects, and the latter also for its calmative effect on the generative organs. To the above remedies Courty says he has added and used with advantage ergot, electricity, stimulating frictions, and sea-bathing.

A. Reeves Jackson, in vol. v. of the *Gynecological Transactions*, has a most interesting and instructive paper on the use of "Uterine Massage" in enlargement of the uterus, and gives the history of several cases in which it was entirely successful after the usual treatment had failed. He describes in his article the cases suitable for this treatment and gives the particular details of the manipulations used.

Of the internal remedies used for the treatment of subinvolution ergot is by all acknowledged as the most important and successful. Bartholow tells us "the indication for the use of ergot in menorrhagia is the existence of the large, spongy uterus—the condition of things which depends on subinvolution of the womb." In vol. xii. of the *Gynecological Transactions*, Dr. Palmer, of Cincinnati, in a paper on "The Therapeutic Value of Some Medicines in the Treatment of Hemorrhagic Conditions of the Uterus," says of ergot: "It is a remedial agent which proves curative in some cases, benefits many, but may aggravate a few. The well-proven physiological effect in stimulating contractions of the involuntary, unstriped muscular fibres, wherever found, makes this drug singularly adapted to conditions of the uterus with developed but relaxed muscular fibres, with dilated and engorged bloodvessels. Hence such pathological states of the uterus as chronic

hyperæmia, of an active or passive kind, chronic metritis in its first stage, subinvolution—attended as they are by increased menstrual flux or by hemorrhage—are controlled by ergot. The more soft, flabby, relaxed, and succulent with blood the uterus is the better the good effects of ergot will be displayed." Thomas, of New York, tells us: "During the state of enlargement—that is, before contraction of the exuberant tissue has taken place—ergot, kept up for a considerable time, produces good results. By its power of exciting contraction of the uterine tissue it diminishes hyperæmia and lessens the bulk of the uterus." Before leaving this subject we will quote, as a caution to those who may use ergot in the future, and perhaps also for the benefit of those who have not hitherto found ergot to answer their expectations in these cases, the following from Bartholow: "The numerous and diverse views which have been expressed may be in fact explained by the character of the preparations. There can be no doubt that the active constituents are unstable, and hence the pharmaceutical products vary, not only in the degree, but decidedly in the character of their actions. In Kohler's investigations, in which he compared the ergotin of Wiggers and Bonjean, there were very wide differences between them. The ergotin of Bonjean—an aqueous extract—excites the vasomotor centre in the medulla and the cardiac inhibitory centre, and very large doses paralyze the heart, the muscular tissue losing its excitability to galvanism. Wigger's ergotin has no effect on the vascular apparatus. In these experiments of Kohler the power of ergot to increase the blood-pressure is an important point. The attentive reader will observe that in these experiments the heart was paralyzed and the irritability of its muscular tissue destroyed. Wigger's ergotin causes cramps of the intestines and violent inflammation of the gastro-intestinal mucous membrane—effects which never result from Bonjean's. Both kinds of ergotin lower the temperature and both retard the respiration. Bonjean's ergotin diminishes the irritability of the peripheral motor nerves and Wigger's increases it. Both lessen the irritability of the sensory nerves. Kohler concludes that when it is desired to slow the heart, contract the vessels, diminish reflex actions, and lessen temperature the ergotin of Bonjean should be used."

Subinvolution can be benefited by the frequent application of the properly selected electric current; but this is an expensive method of treatment, requiring frequent visits to the practitioner's office and also necessitating more or less special knowledge and the possession of expensive apparatus.

That the repairing of a torn cervix or the suturing of a ruptured perineum will assist in the removal of this condition of defective involution is well established; however, we are now only having reference to such cases as refuse to consent to be "laid up" for the long time made imperative by these procedures.

What shall we do, then, for these women who come to us complaining of pelvic dragging, backache, leucorrhœa, and most of them also anæmic, with poorly performed digestion and defective chylopoëtic action generally?

First of all, let us sustain this heavy uterus which we find in the first stage of prolapsus or in the perineum, for the uterus has descended by its own weight and from the laxity of the usual supports, and the displaced organ is thus kept in a state of engorgement from its circulation being impeded by the abnormal position. In my experience this support is well given by the proper adjustment of a soft-rubber ring-pessary, and I have received the most enthusiastic acknowledgments of the patient for the comfort thus given her even before she left my consulting-room.[1]

In these cases constipation is best relieved and the congested pelvic viscera benefited by sufficiently large doses of sulphate of magnesia to produce one or two watery stools each day.

Emmet tells us "that a copious flow over the vaginal surface of water varying in temperature from 100° to 110° F. is most appropriate for all cases in which congestion exists." "The injections," says he, "can be better given to the patient after she is undressed for the night and in bed. She should be placed near the edge of the bed, with the hips elevated as much as possible by the bedpan and a small pillow under her back, the lower limbs being flexed. Her body must be covered to protect her from cold and her position made perfectly comfortable; whenever the bed is a soft one, for the purpose of keeping the hips elevated a broad board should be placed under the bedpan to prevent it from sinking into the bed from the weight of the patient. The vessel of hot water is placed in a chair by the bedside. The water must be thrown in very carefully at first until the vagina has become distended." Lastly, and not the least important, the patient should be advised to support all the heavier skirts from the shoulders; and should the abdominal walls be extremely lax, as we so frequently find in multipara who have borne a large number of offspring in rapid succession, a properly fitting abdominal supporter will give relief.

"But the time has now surely come when the surgeon, whose knife is ever warm from contact with living tissue and whose pen is ever busy announcing and defending the claims of his work, might give a little time to those who have other life-saving means to proclaim; at least, while others are honestly discussing the value of certain surgical procedures, the busy operator may, while he pauses to wipe the perspiration from his own forehead, look back and join in the efforts to solve the problem of the real and apparent value of his doings."

[1] Thomas tells of a medical acquaintance of his who declared he never knew a case in which pessaries did good. This explained itself to Thomas later, when he discovered that his friend always introduced the pessary *upsidedown*.

REVIEWS.

THE TECHNIQUE OF SURGICAL GYNECOLOGY. By AUGUSTIN H. GOELET, M.D., Professor of Gynecology in the New York School of Clinical Medicine; Consulting Professor of Gynecological Electro-therapeutics, International Correspondence Schools, Scranton, Pa. New York: International Journal of Surgery Company.

AN act and the purpose for which it is performed are two very different things, and criticism of the one may not be at all applicable to the other. Thus in the making of books it is one thing to write with a bad purpose and another to produce a good book while so doing.

In the present volume the author states in his preface that "the purpose of this work is to describe with sufficient fulness and clearness of detail the operative technique of the more common gynecological operations, that it may serve as a guide to the operator who is not thoroughly familiar with them. Unfortunately works on gynecology are lacking on this point, and many men are obliged to operate without either having assisted or witnessed them at close range." The aim of the author, therefore, is to create a short cut in gynecology, or, in other words, to substitute theoretical knowledge in place of the practical experience only to be gained by standing day after day, year in and year out, on the opposite side of the table from a man skilled in this particular line of work, who, it is to be remembered, only reached his position after years of the same drudgery. It is an alluring prospect, it flatters the vanity, but, like the mirage of the desert, it is a deception. Unfortunately useless sacrifice of human life may be the price paid by the would-be operator in learning that there is a vast difference between theoretical and practical surgery.

Of course, it is true that there are occasions when a woman far from skilled surgical aid may be in a condition demanding immediate operation, but such cases are rare, and if confronted by them it will be better that the general practitioner, unskilled in major surgical technique and without the least idea of surgical cleanliness, shall hold his hand. No book-training, no matter how closely he has applied himself to its mastery, will ever justify a man in undertaking major surgery unless the alternative of non-interference be certain death.

So much for our ideas regarding the author's aim in writing the book. Now as to the book itself. It is well written and is well worth reading. The chapters on the preparation of the patient for operation and the after-care are especially good, and the importance of surgical cleanliness is everywhere insisted upon. Conservatism in operating is also strongly emphasized, and while some of the advice given on this phase of the subject seems a little extreme there is no doubt that there is still room for earnest work along this line.

Unfortunately, however, there are some things in the book which seem out of keeping with its general excellence of tone. Much to be deplored is the statement when speaking of amputation of the cervix that the complete form of operation is "done for carcinoma which is confined to the cervix." This seems, at least tacitly, to give consent to this method of treatment of very early cases of cancer, and will certainly be considered an inexcusable statement by the majority of operators. Remembering the class of readers for whom the author is confessedly writing, it is certainly the more reprehensible in that it may, by belittling the dangerous nature of the pathological condition, deprive patients of the chance, slight though it may be, which a radical operation offers. It seems strange that in speaking of the repair of lacerations of the perineum there is no mention made of Emmet's operation, and also that so much stress is laid upon the use of silver wire in repair of the cervix. Certainly the combined experience of the great majority of operators shows that the above-mentioned operation is by far the best for the ordinary type of case, and that the use of the latter may be well discontinued in favor of other forms of suture material. W. R. N.

THE HISTORY OF MEDICINE IN THE UNITED STATES. A Collection of Facts and Documents Relating to the History of Medical Science in this Country, from the Earliest English Colonization to the Year 1800, with a Supplemental Chapter on the Discovery of Anæsthesia. By FRANCIS RANDOLPH PACKARD, M.D. Illustrated. 8vo. Pp. 542. Philadelphia and London: J. B. Lippincott Co., 1901.

IN these days of progressive scientific medicine, where almost all that is useful for the practical medical man in his daily routine work is obtained by careful clinical study and painstaking laboratory research, and where all is hurry and rush toward a goal of precision that is ever alluring us onward, it is with the utmost pleasure that one is enabled by such a book as this to lay aside his duties and be allowed to delve into the history of his own past worthies and con the empirical triumphs of the medical ancestry of his country.

To accomplish such a task successfully much useless detail must be gone over, and most patient research in order to complete the defects of previous imperfect work must be made, while the broadest study of the most diverse subjects must be methodically pursued in the hope to extract some desired-for truth that might have otherwise remained hidden and unknown in its unusual situation. To the author the task of unearthing this vast amount of broadly scattered information, with the necessary exercise of patience and judgment to arrange it into a chronological and readable order, has been, as we who revere such work would desire it, "a labor of love."

The work opens with an account of the medical events connected with the early history of the English colonies in America. As the author says, although there is not much available information regarding those who practised medicine in the infancy of the general colonies, yet it is of great interest, "as those men laid the seed of future medical

progress in this country, and many of them seemed to have been possessed of much ability and medical learning, such as it was in their day."

On page 46, in speaking of the broadly accredited belief that the first autopsy in this country was performed in 1690 by one Dr. Kerfbyle upon Governor Slaughter, he unequivocally says: "There are, however, records of four other autopsies which were held at an earlier date than the one on Governor Slaughter." Later, on page 62, the author gives a series of detailed descriptions and most convincing proofs of "The Earliest Recorded Autopsies in America," showing that the first mentioned is to be found in "An Account of Two Voyages to New England," published at London, in 1674, by John Josselyn.

The chapter on the "History of the Medical Societies Founded Before the Year 1800" is one of the most valuable in the book. In it the author states that "the first association of physicians into a society of which there is any record in America was in Boston. It existed from 1735 until at least 1741, when it disappeared in the sands of time."

On page 160 he says that "the first man to receive a medical diploma in North America was Daniel Turner, who received the gift of an honorary degree of Doctor of Medicine in 1720 from Yale College." "The first man to publish a work on a solely medical topic (page 229) was the Rev. Dr. Thomas Thacher, who was born in England." It appeared in 1677, and was entitled "Brief Rule to Guide the Common People of New England How to Order Themselves in the Small Pocks, or Measles."

The portion of the work devoted to the discovery of anæsthesia is most graphic. Attended as it was "by the bitterest and most acrimonious discussion as to who was its real discoverer," the author, after most careful study of the rival claims, makes the following terse and emphatic statement: "In my opinion the credit of first using ether as an anæsthetic is due to Crawford M Long, and the credit of demonstrating its value and use to the medical profession and the world must be ascribed to W. T. G. Morton."

Desultory perusal of many of the contained subjects soon shows a picturesqueness of style and a vividity of scene that irresistibly leads one on page by page until the special topic under consideration has been completed; while, on the other hand, methodical reading of the work, as becomes necessary to the conscientious reviewer, early makes manifest such an earnestness of purpose and so great a desire for contemporaneous proof that the reader involuntarily feels the surety of the assertions and recognizes the authority of the writer.

That its pages may ever remain with us as the best, the most certain, and the most greatly sought-for embodiment of historical research into the doings of the medical guild of our country prior to the nineteenth century—an exposition, as it were, of the early struggles of individual empiricism upon which American scientific medicine of to-day is mainly based; and that the name of the one who has offered us this account of our medical life history, and thus given us inducement to further strive, may be never forgotten among us—are the hopes and the wishes of him to whom the privilege of writing these lines has been given.

C. A. O.

THERAPEUTICS: ITS PRINCIPLES AND PRACTICE. By HORATIO C. WOOD, M.D., LL.D., Professor of Materia Medica and Therapeutics and Clinical Professor of Diseases of the Nervous System in the University of Pennsylvania. Eleventh edition. Remodelled and in greater part rewritten by HORATIO C. WOOD and HORATIO C. WOOD, JR., M.D., Demonstrator of Pharmacodynamics in the University of Pennsylvania. Philadelphia and London: J. B. Lippincott Company, 1900.

A PRACTICAL TREATISE ON MATERIA MEDICA AND THERAPEUTICS, WITH ESPECIAL REFERENCE TO THE CLINICAL APPLICATION OF DRUGS. By JOHN V. SHOEMAKER, M.D., LL.D., Professor of Materia Medica, Pharmacology, Therapeutics, and Clinical Medicine, and Clinical Professor of Diseases of the Skin in the Medico-Chirurgical College of Philadelphia; Physician to the Medico-Chirurgical Hospital. Fifth edition. Thoroughly revised. Student's edition. Philadelphia, New York, and Chicago: F. A. Davis Company, 1900.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS, WITH ESPECIAL REFERENCE TO THE APPLICATION OF REMEDIAL MEASURES TO DISEASE AND THEIR EMPLOYMENT ON A RATIONAL BASIS. By HOBART AMORY HARE, M.D., B.Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia; Physician to the Jefferson Medical College Hospital. Eighth edition, enlarged, thoroughly revised, and largely rewritten. Philadelphia and New York: Lea Brothers & Co., 1900.

SOME idea of the differences of plan and scope underlying these three works on the same general subject and emanating from teachers holding chairs in three medical colleges of Philadelphia may be gathered from a consideration of their titles and sub-titles. But no one who has not had occasion to critically study and compare them side by side can appreciate from what different stand-points they are written or realize that, though so unlike the others, each one can in its way deserve the highest praise. The veteran Wood, now in its twenty-fifth year and eleventh edition, is so well known and universally used as to require but little description, although in its remodelling some radical changes have been made that deserve more than passing notice. In accordance with the progress that has been made in pharmacodynamics during the last decade whole points of view have changed and new presentations of old subjects become necessary, so that in order to maintain its authoritative position in the literature of pharmacology much recasting of the material has been required. The principal alterations consist in some condensation of the various articles both by rewriting and rearrangement in a more closely knit form, in putting into separate sections, printed in smaller type, the detailed descriptions of the results of investigation on the lower animals, and in relegating to a position at the end of the chapters the references to the literature, which are thus collected and classified in a manner convenient for reference, while at the same time the text is purified of much parenthetical writing that formerly made the page a difficult one to read.

Another feature that will be especially appreciated by students is the concise summary in bold-face type appended to the description of each drug and containing a terse account of its most important physio-

logical actions. Discussions made unnecessary by the advance of knowledge have been dropped and articles on new drugs added, so that the work remains, as it has always been, our most scientific and philosophical work on the physiological action of drugs, and the present volume is so essentially a new one that its acquisition is almost a necessity to those interested.

Shoemaker's treatise is more particularly adapted for use as a text-book, and, indeed, the author has intended it as such, since it is inscribed as a student's edition, and promise is made of a later larger volume designed for the practitioner and containing a greater range of subjects than the present one, which is devoted almost entirely to the drugs of the United States and British Pharmacopœias. For this reason the book is of especial value to the class for which it is designed, since we know of no other commentary on the Pharmacopœia from a pharmaceutical stand-point which is at the same time sufficiently extended in its treatment of drugs to supply an adequate degree of information on physiological actions and therapeutics. Too high praise cannot be given this latter section, for it is unusually rich in formulæ, and the clinical index covers a most exhaustive range of topics, so that it is hard to conceive how another edition can be made more complete save by the addition of articles on the not very extensive list of important non-official drugs.

It is characteristic of the author that, although due importance is given to the work of other observers and their writings and opinions are freely quoted, every essay abounds in original observations and fresh presentations of the subject-matter. This is very strikingly so in the sections on therapeutics, which are rich in reference to the untoward or by-effects likely to be produced, individual susceptibilities to drugs and to practical points in their administration and combination with other remedies, and valuable suggestions in the treatment of disease, so as to at once stamp the author as a clinician of keen discernment as well as a widely read pharmacologist. It is worthy of note that, although three of the authors under consideration employ both the apothecaries and the metric systems, in the present volume the French measures are given the precedence.

In taking up Hare's book, after having turned the crowded pages of the other two works, the first feeling is one of doubt as to whether the ground can be covered thoroughly by such comparatively short articles. But this soon vanishes, for the perusal of one or two is sufficient to convince one of the intensely practical character of the volume. Intended for practical every-day use and written by a practical man who has known how to eliminate all the dead wood of theory and controversy and present facts and useful methods with wonderful clearness and force, the gist of many pages from scores of original monographic articles is condensed into a paragraph and the practical lesson to be deduced expressed in a single sentence, but in no case has accuracy or clearness been sacrificed to conciseness.

Four general subdivisions have been made: First, a brief consideration of general therapeutic principles, incompatibility, contraindications, etc., then the section devoted to drugs themselves, followed by another on remedial agents other than drugs, and a very useful chapter on

Foods for the Sick. The latter portion of the work is given up to short outlines of the most approved plans of treatment of the commoner diseases, arranged alphabetically for convenience of consultation, which is further enhanced by the system of cross-references.

From what has been written it is evident that no one of these books can adequately replace the others. The domain they are intended to cover is so extensive, embracing as it does practically the whole end and aim of the practice of medicine, that it is small wonder that each one may advantageously be supplemented by the other. Each of the three authors has solved the mooted question of the classification of drugs in a different way and in a manner suggestive of the trend of his book. In Wood, which is *par excellence* the reference-book and fruit of scientific years of research and laboratory work, the drugs are grouped according to their physiological action, as depresso-motors, delirifacients, etc. Shoemaker has chosen the pharmacopœial nomenclature and follows its order, laying stress on pharmaceutical points, and, by his graceful and interesting style, making what is usually a dry and difficult study especially appealing to students; while Hare, writing from the stand-point of the busy practitioner, arranges his topics alphabetically, according to their English names, and devotes particular attention to the vicissitudes of every-day practice.

S. E. J.

MENTAL AFFECTIONS: AN INTRODUCTION TO THE STUDY OF INSANITY. Pp. 380. By JOHN MACPHERSON, M.D., F.R.C.P.Eng. London: MacMillan & Co., limited. New York: The MacMillan Company, 1899.

THE volume comprises a series of lectures, extended and rearranged, delivered by the author to students attending the class of mental diseases in the Royal Colleges' School of Medicine, Edinburgh. The modest title of this book, approaching as it does the dignity of a treatise, does not fully disclose its intrinsic value, containing, as it appears, the large clinical experience and deductions of the author derived from his connection with the asylum for the District of Stirling, Scotland, and elsewhere. It is a sidelight also on the mental equipment of a class of medical students that such a course of lectures should form a part of the curriculum of a medical college.

Nineteen chapters are divided into three parts. Part I. is devoted to a consideration of the subject of morbid heredity, by which it is to be understood that the morbid *basis* only persists and is transmitted, the neuroses being transformed in each succeeding generation, and known as dissimilar heredity, or heredity by transformation. Diathetic and nervous conditions are seldom transmitted exactly in the same form from parent to offspring. The appearance of abnormal qualities is ascribed by the author to a defective power to transmit, in part, perfectly normal characters, by which a tendency to degeneration may be corrected, and the crippled development of the spermatic and ovarian cells.

A few of the prominent causes conducive to degeneration are named as: 1. Civilization. 2. Deficient alimentation. 3. Alcohol. 4. Syphilis. 5. Tuberculosis. 6. Infectious and miasmatic diseases. 7.

The arthritic diathesis. All of these causes are discussed, and their influence in the evolution of insanity and allied nervous affections is shown in connection with other active determining influences in producing insanity which the author calls social causes—as civilization, religious and political movements, education; biological causes—as age and sex; physiological causes—as nutrition, sleep and dreams, reproduction and puerperal conditions. Allusion is made to moral causes—as the influence of the emotions, and to physical causes—as environment, the seasons, heat, cold, and traumatism. Among the determining causes of insanity are included all those poisons that act upon the nervous system directly and indirectly—as intoxicants, including drugs, auto-intoxication from various sources, and from micro-organisms introduced into the system, the insanities resulting being recognized as instances of abnormal mentalization rather than the mental symptoms due to organic brain changes. The causes enumerated in hospital reports are usually divisible into those that are called moral and physical.

Much space has been given to hereditary degeneration in its relation to mental disease. While there may be a general agreement that hereditary degeneration is a most important factor, there may be some dissent from the author's views. For instance, it is stated that "insanity is not a chance occurrence like catarrh, an accident, or an attack of typhoid fever. . . . It may therefore be generally stated that in order to become a lunatic a person must inherit a vice of organization which will manifest itself in mental aberration. This vice of organization is called degeneration." We may perhaps discover in these strong assertions a consistency with the theological doctrines of election and predestination, which are said to be so stoutly held in the author's country; but, while there will remain those who will dissent from a general acquiescence in such views, they are, nevertheless, accepted by large numbers, and deserve attention when they are introduced in the course of trials, as now frequently happens, as a screen to shield a criminal from the consequences of crime. It has happened that some abnormality of the ears, the quality of the hair, an asymmetrical head, a receding chin, have been accepted as a basis to found a plea of degeneration and irresponsibility. At the date of this writing a trial is in progress in a neighboring State where the principal defence is that because of the atrocious nature of the crime, and as the parents were first cousins, the criminal must be a degenerate and therefore irresponsible. From the existence of some appearances of irregular physical development which are visible to the eye, and which may be conceded to be in the nature of degeneracy, the conclusion is reached that there must be a corresponding degree of mental and moral degeneracy that takes the criminal out of the category of responsibility, and with the same reasoning might apply as a test of testamentary capacity. While the author does not announce the extreme doctrines above, they are nevertheless held and exploited on occasions, and we desire to note that the author has devoted an unusual space to the discussion of degeneracy in its relation to insanity.

Part II. is mainly devoted to the consideration of the physical and mental stigmata of degeneration, and, including Part I., comprises one-third of the volume. The remaining chapters are devoted to *Clinical Symptomatology*, or the clinical symptoms of various mental affections,

beginning with mania, melancholia, etc. The author discloses his individuality in following a well-understood nomenclature, and has not clouded his meaning by the use of terms which might require a too frequent reference to a classical dictionary. If in a critical mood, we might ask why the consideration of mania should precede that of melancholia, as the former is so frequently but an evolution from the latter, and we might further add that too little stress is laid upon those neurasthenic conditions that foreshadow so many insanities. In addition to a discussion of several well-recognized forms of mental affection, there are three chapters devoted to the clinical study of toxic insanity and confusional insanity arising from physical exhaustion, nervous shock, or malnutrition, the delirium of collapse, puerperal and other insanities of infective origin, acute delirious mania, microbic toxins, confusional states arising from alcohol and excessive use of drugs, all of which have been studied and recognized more clearly in recent years, and now must have a distinct place. Other chapters are devoted to the insanity of the degenerate, moral insanity, insanity in connection with the neuroses and from organic brain disease. All of these mental affections should have a proper place in the lecture-room. The author has ably and well treated every topic he has considered, has honestly given out the best of his experiences, free from professional dogmatism, and the book will have a foremost place among those of recent years devoted to the consideration of mental affections.

J. B. C.

ATLAS AND EPITOME OF DISEASES CAUSED BY ACCIDENTS. By DR. ED. GOLEBIEWSKI, of Berlin. Translated from the German by PEARCE BAILEY, M.D. Philadelphia: W. B. Saunders & Co., 1900.

THIS book might well be called the prognosis of accidents. There is presented in this volume a systematic description of the sequel of injuries caused by accidents. The book is divided into two parts, one treating of injuries in general, the other of injuries affecting special structures and regions of the body.

The symptomatology of the sequels of the various forms of injury date usually from the termination of both medical and surgical treatment.

The book is based upon an experience of thirteen years with accident cases, or about 5245 cases, many of which have been followed long enough to know the final result. Germany in 1884 passed a law insuring workmen against injury. Under the German method any factor except the extent of the injury is fixed and uniform. In the United States nothing is fixed except the principles of the law in the judge's charge to the jury.

According to the German law the insurance allowance may be diminished or increased according as the injured person gets better or worse with time. It does away with the question of exaggeration.

This law in Germany has been a stimulus to medical men to become familiar as experts with the results of traumatism to the body.

The introduction to the American edition is splendidly written, and is full of suggestions.

The end-results of many fracture cases are carefully recorded. The general results following fractures of different regions are summarized.

The average student in graduating from any of our first-rate medical schools has been so occupied during his student days with the details of his medical and surgical work that he has little time to devote to *prognosis*—he sees patients in the various clinics, but he only exceptionally sees them later. This is particularly true of cases of fracture. Here the prognosis is important. A knowledge of the results of fracture is of very great importance. Few hospital surgeons have a definite notion of these after-results.

In this volume are collected the end-results of the author's many cases of fracture of the bones of the body. The statements may be taken as representing approximately the experience of American surgeons. This book represents the result of an enormous and painstaking industry on the part of the author. It is a pioneer in traumatic surgery, and will repay one for a careful study. The book is profusely illustrated.

If this volume shall stimulate surgeons in this country to a more accurate observation, and a more prolonged observation of their cases in all departments, it will have served a most useful purpose.

Very many medico-legal opinions have little basis in solid facts; the opinions are not well founded, for the very reason that the expert has often little recorded or personal experience upon which to put a judgment. This volume will assist many medico-legal experts who deal with traumatisms. C. L. S.

MANUAL OF DISEASES OF THE EYE. By CHARLES H. MAY, M.D. With 243 original illustrations, including twelve colored figures.

IN the rapid multiplication of text-books it has become necessary to attempt a classification of them according to their contents and the place in medicine which they are supposed to fill. Thus, the name of *quiz compend* has been given to the work of humblest aspirations; *manual* to that of next greater pretension. By *text-book* is usually understood a volume which contains such a complete exposition of the subject of which it treats that the student is enabled to gain a thorough knowledge of it from a study of its pages, while the dignity of the name of *system* is reserved for more comprehensive books, generally of a composite nature, the product of the pen of different authors who are supposed to be particularly fitted to elucidate the subjects assigned to them.

The value of the first two of these, of the quiz compend and of the manual, has ever been doubtful in the mind of the reviewer, as he questions very strongly whether the study of such jogs to memory—for they are but little more—can ever be of lasting good to the reader. These books are particularly recommended by their authors to students and general practitioners—to those, in other words, who are quite unfamiliar with the subject. It would seem that these classes of readers need a book that is not so much concise as it is explanatory, so that in place of these elementary treatises it is the custom of the reviewer to recommend a text-book, of which there are so many admirable examples, to all beginners in ophthalmology.

Dr. May, however, has written a most excellent little book—the best of its class, perhaps—and to those in search of a manual it may be frankly recommended. The arrangement of the subject-matter is excellent, its style easy, and the text gives evidence of having been carefully prepared. W. C. P.

A TREATISE ON APPENDICITIS. By JOHN B. DEAVER, M.D., Surgeon-in-Chief to the German Hospital, Philadelphia. Second edition, thoroughly revised and considerably enlarged. Illustrated with 22 full-page plates. Octavo. Philadelphia: P. Blakiston's Son & Co.

THE chapter on the Pathology of Appendicitis is a most clear statement of the conditions existing. The plates illustrate so well that they add greatly to the descriptive text. This volume is a splendid guide to the practitioner. Only superlative praise can be properly given of the book.

The symptomatology is grouped about the two great clinical classes of cases—the acute and the chronic. This grouping simplifies one's conception of a disease having such a variety of pathological lesions.

The chapter dealing with differential diagnosis is satisfactory in that all the lesions most likely to be confused with an appendicitis are carefully considered.

The chapter on Treatment discusses the many phases of the subject. No practitioner has a right to advise his patient upon the matter of treatment without the advice of a surgeon who is skilled in the care of appendicitis cases.

Dr. Deaver takes the ground that as soon as the diagnosis of appendicitis is made operation should be done at the earliest convenient opportunity. This is safe advice. There are but few conditions which will justify the delay of operative treatment.

He also thinks that operation is contraindicated in those cases of diffuse peritonitis with distended abdomen, high temperature, rapid pulse, anxious expression, continuous vomiting, and diffused tenderness.

We believe that this desperate class of cases is to be dealt with according to the peculiarities of the individual case. We have seen cases which might properly be grouped in Dr. Deaver's "contraindicated" class operated upon and recover. On the other hand, Dr. Deaver says some such cases unoperated and treated medically have in his experience recovered. These cases cannot be treated as a class. We are of the opinion that many of the desperate cases of general peritonitis have recovered because they were operated upon. We are likewise of the opinion that with very few exceptions these desperate cases are far safer after a rapid operation for cleansing and drainage than from expectant and medical treatment. The moribund cases, of course, should not be operated. The desperate cases that are not moribund, however, should be given the benefit of an operation.

Every practitioner and surgeon should own and read and reread the chapter in this book on the Pathology of Appendicitis; it is wisely written. C. L. S.

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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Intestinal Perforation in Typhoid Fever.—W. OSLER (*Philadelphia Medical Journal*, January 19, 1901), in discussing perforation and perforative peritonitis in typhoid fever, directs attention to the fact that a very large proportion of the cases of perforation show conditions which are not at all characteristic, according to the general description of this condition. He believes that with proper diagnosis surgical intervention would greatly reduce the mortality from perforation, and perhaps about half the cases could be saved. The great trouble is that we know too little about the diagnosis of perforation. His recommendations are that in cases in which the occurrence of perforation is suspected a skilled diagnostician should be, if possible, in constant attendance so that the diagnosis may be made as early as possible, and if perforation occurs surgical intervention should be undertaken at once. The accident is likely to occur during the more severe cases and during the height of the disease. It occurs more frequently in cases showing diarrhœa and tympanites; of 30 cases observed at Johns Hopkins Hospital 20 had diarrhœa and 6 had both perforation and hemorrhage. If marked abdominal symptoms appear perforation should be watched for constantly. He recommends that one should be always on the alert for any distinct abdominal pain, particularly when it shows severe onset and is intense and tends to grow worse; it should be especially determined whether the pain is diffuse or localized toward the lower right side of the abdomen. One should also note whether the abdomen is flat, scaphoid, or distended, particularly whether it is uniformly distended, whether respiratory movements are present over the abdomen, and whether they are uniform and seen both above and below the navel. One should note tension and pain on palpation, muscular rigidity, and spasm, particularly in the epigastric region and right iliac fossa, and whether spasm is found by rectal

examination. The liver dulness should also be watched in the middle, nipple, and mid-axillary lines; auscultatory percussion may be an aid in this. Any tenderness or fulness discovered by rectal examination is important. Blood and sloughs should be looked for in the stools and any change in their character noted. As to the general condition of the patient, any change in expression should be noted, together with increase in the rapidity of the pulse, decided change in the temperature, sudden increase in the respirations, or a shallowness or sighing character of the respiration. The occurrence of sweats, of vomiting, and of hiccough may be important, and one should also look for a change in the leucocyte count, having in mind that there is an almost constant leucopænia in typhoid fever. He describes in detail three cases in which, in the absence of typical symptoms, a diagnosis of perforation was made and operation performed. The first patient died, apparently chiefly from the effects of the disease itself. In the second case death occurred on the table. In this instance the walls of the gut were so swollen and infiltrated that sutures would not hold in the neighborhood of the perforation. In the third case complete recovery occurred. As to the general results of operation in the Johns Hopkins Hospital, Osler mentions one series of 11 cases in which 5 recoveries occurred. In all 16 cases have been operated upon, with 6 recoveries, a percentage of 37.5.

Disinfection of Typhoidal Excreta.—N. B. Gwyn (*Philadelphia Medical Journal*, January 12, 1901), after insisting upon the importance of infected typhoidal urine in the dissemination of typhoid fever, reports his results in studying the effects of various antiseptics upon urine containing typhoid bacilli. In conclusion, he states that milk of lime is not deserving of the name of disinfectant. Carbolic acid is useful only in large amounts and in strong solution if a rapid action is desired. Formalin is efficient, but very expensive for ordinary use. Bichloride of mercury, chlorinated lime, and liquid chlorides are very valuable, are rapid in action, and are efficient in comparatively dilute solutions. For disinfection within five minutes he states that of a 1: 20 carbolic-acid solution one needs half the volume of the urine to be disinfected; of a 1:40 carbolic-acid solution one should use two-thirds of the volume of urine to be disinfected; while of a 1:1000 bichloride of mercury only one-fifth the volume of urine is necessary; of a 10 per cent. formalin solution, three-tenths the volume of urine should be used; of saturated chlorinated lime one-fortieth the volume of urine, and of liquid chlorides two-fifths the volume of urine. He states that the disinfection seemed to be quite as rapid in urines containing albumin as in those free from albumin. For irrigation of the bladder he states that solutions of bichloride in strengths of 1:100,000 to 1:50,000 are most successful. He considers urotropin the only substance which produces any effect when given by the mouth.

Auto-intoxication.—H. Strauss and H. Philippsohn (*Zeitschrift für klin. Med.*, Band xl., p. 369) discuss the excretion of enterogenous decomposition products in the urine under constant diet and insist upon the importance of constant diet in similar studies. Their researches were carried out

by using a test diet, which they describe. They estimated quantitatively the amount of volatile fatty acids and ethereal sulphates in the urine and made qualitative estimations of the phenol and indican. About 100 results are reported; some of these were obtained in persons who had gastro-intestinal affections, others in patients who had no such disturbance. The normal value for volatile fatty acids in the urine was accepted as between 40 and 80. Alimentary factors were found to have no constant influence upon the excretion of the volatile fatty acids, even diarrhœa having no pronounced influence. Constipation did, however, have a notable effect upon their amount, as well as upon the aromatic oxyacids, the ethereal sulphates, the phenol, and the indican. Changes in the gastric secretion had no notable influence upon the excretion products with the exception of the ethereal sulphates. There was a general tendency to decrease of the ethereal sulphates with hyperacidity and increase with hypoacidity or anacidity. This influence was, however, not at all constant. A very marked increase in the putrefaction products was seen in two cases of disease of the liver. The most important statement which the authors make is that their results lead them to conclude there is excellent evidence that the amount of putrefaction products in the urine varies much more markedly according to the conditions of the tissues in general than in accordance with the condition of the gastro-intestinal tract; in other words, that with normal conditions of the gastro-intestinal tract or with imperfect tissue action the products of putrefaction found in the urine are much increased, while with normal tissues the products in the urine remain normal, often even when there is marked increase in the production in the intestine. They decide from this that, as a rule, when they are increased one is far better justified in speaking of "tissue intoxication" than of "gastro-intestinal intoxication," though both may be present. Finally, in discussing some observations concerning the excretion of acetone, they state that a marked increase in the fatty acids in the intestinal contents seems to increase the acetone excretion.

Post-hemorrhagic Hæmoglobinuria.—MICHAELIS (*Deutsch. med. Woch.*, 1901, xxvii., 51) reports the case of a woman who had a sudden, very extensive intra-abdominal hemorrhage from a ruptured tubal pregnancy. On the day after the hemorrhage the examination of the blood showed but 25 per cent. of hæmoglobin, and a few nucleated red blood-corpuscles. The urine, which was examined for the first time the day after the hemorrhage, was of a dark, reddish-black color, and contained a trace of albumin and abundant blood-coloring matter. The centrifugalized sediment showed a few short granular casts and hardly a single red blood-corpuscle. On the following day the hæmoglobin had increased in quantity, but a day later it had entirely cleared up. The patient made a gradual recovery, but, on the fifth day after the disappearance of the hæmoglobinuria, there were slight chilly sensations, a sudden rise of temperature to 38.6° and a fresh attack of hæmoglobinuria which lasted four days.

According to Michaelis, these attacks, occurring during the absorption of a large intra-abdominal hemorrhage, may be accounted for either by the assumption of the absorption of the coloring matter directly into the b'ood and its excretion by the kidneys, or by the formation of a hæmolysin, which,

acting upon the blood-corpuscles of the patient, produced the hæmoglobinæmia and hæmoglobinuria.

The first possibility seems scarcely probable inasmuch as no such instance has ever been noted, urobilin alone having been found in the urine in such cases. The other possibility, however, is extremely interesting in connection with the observations of Bordet and Ehrlich and Morgenroth. These observers have shown that after continued injections of blood of an animal of one species into that of another, the serum of the animal inoculated acquires the power of dissolving the blood-corpuscles of the other animal. This power is lost by heating to a temperature of 55°, but is acquired again if a little normal serum be added. From many researches Ehrlich and Morgenroth came to the following theoretical explanation of these facts.

The actual blood-dissolving principle is present in normal serum, but fails to exercise its power because it is unable to unite with the molecules of the red blood-corpuscles. The serum of an animal which has received injections of blood differs from normal serum in that it contains a body which, on the one hand, unites with the molecules of the red blood-corpuscles, and, on the other hand, with this dissolving principle, which is present in normal serum, thus favoring the action of the latter upon the red blood-corpuscles. Ehrlich speaks of this specific body, present only in blood which has been treated by this method, as the *immune body*, the other as the *addiment*. The first he calls the *intermediate link*, the latter the *final link*. The *final link* is so unstable that it is rapidly destroyed at a temperature of 55°, while the *intermediate link* is more resistant. If, then, one heat to 55° C. the serum of an animal which has been previously treated with injections of blood the *final link* is destroyed, and the serum is thus deprived of its blood-dissolving property. But since the *final link* is present in every normal serum, the addition of a little such brings back again the blood-dissolving properties.

The origin of the *intermediate link* Ehrlich accounts for, according to his antitoxin theory, in the following manner: The molecules of the sheep's blood-corpuscles may contain special chains of atoms which may be indicated by the sign +a. In certain cells of the organism of the goat there are found chains of atoms which have the property of uniting with this +a group. This corresponding group may be indicated by the sign —a. If, then, sheep's blood be injected into a goat all the +a groups will unite with the corresponding —a groups; but inasmuch as the —a groups must have some physiological importance in the organism of the goat, the goat would of necessity suffer if these groups, which are now put out of function, were not regenerated. Therefore, the organism of the goat produces an abundance of fresh groups of —a atoms, and, indeed, according to Weigert's law, in a quantity far above that actually called for by the organism. The result is that the excess of the —a atom groups are cast off from the mother molecule and accumulate in the blood, forming thus the specific *intermediate link*.

Lately Ehrlich and Morgenroth have called attention to the fact that this *intermediate link* arises not only when the blood of an animal of one species is injected into that of another, but that a hæmolysin is obtained when one injects the blood of one goat into the blood of another. Such hæmolysins they have termed *isolysins*.

The question which now naturally arises is: Why if one injects into an animal his own blood, or if an animal absorbs rapidly an extensive extravasation, does there not arise an *autolysin*—that is, a hæmolysin which destroys its own blood-corpuscles?

One might further ask why there is not always an *autolysin* present in the blood, if, as must be the case, the blood always contains corpuscles possessing the +a groups of atoms. This latter question is easily answered, for the +a groups are not free in the blood, but are bound to the red blood-corpuscles and are, therefore, unable to unite with the —a groups wherever they may be present. For this to occur the +a groups of atoms must be present in the blood in solution, as they would be in the absorption of an extravasation. Why, then, does not an *autolysin* arise during the absorption of an extravasation? This Ehrlich explains in an interesting manner. With the absorption of an extravasation a number of molecules which possess the +a groups of atoms enter the blood and will immediately seek out in the organism the —a groups in excess and unite with them. But this is a stimulus for the organism to produce —a groups in excess and to cast them off. So that free —a groups, in other words, an *autolysin*, should escape into the circulation. But since there is no reason to assume that the +a groups are only found in the blood and not also in other organs, this *autolysin* (the —a groups) is bound not only to the blood-corpuscles but to all other cells which possess the +a groups of atoms. As a result of this, again, an excess of +a groups are produced and cast off, and these escaping in a free state into the blood constitute an *anti-autolysin*. In other words, the appearance of a small quantity of *autolysin* would constitute a stimulus for the organism to produce immediately an *anti-autolysin*. But if this idea be correct one might still expect sometimes to see evidences of the formation of an *autolysin;* this might, for instance, occur when the absorption of a large extravasation of blood occurs so quickly that the organism has not sufficient time to form a proper quantity of *anti-autolysin*. The authors, nevertheless, had never been able to observe a case of this sort. Michaelis, however, points in an extremely interesting manner to the possibility that this case, in which there occurred extraordinarily severe hemorrhage which was absorbed very rapidly and followed by hæmoglobinuria, *very probably constitutes exactly such an instance.* Ehrlich's hypothesis is, of course, unproven, but the author points out that it is the most satisfactory hypothesis for the explanation of immunity and the development of lysins which has yet been advanced.

Concerning the Antiphlogistic Action of Cold Applied to Points Distant from the Seat of Inflammation.—EMMERT (*Fortschritte der Medicin*, 1901, xix., p. 161), in Goldscheider's clinic, has repeated some experiments which were made by Samuel in 1892, with regard to the antiphlogistic action of cold applied at points distant from the seat of inflammation. Samuel noted that if croton oil were applied to one ear of the rabbit, while the other was immersed in water, the inflammation was materially delayed. In control rabbits the process came on in five hours, while in those in which the opposite ear was immersed, no signs of inflammation were to be noted throughout the experiments, which lasted up to twelve hours. On removing the ear from the water, however, the inflammation began. Samuel's explanation

of this antiphlogistic action was that, owing to cooling of an extensive vascular area, the leucocytes which passed through the vessels were, for a certain length of time, deprived of their active motility. In repeating Samuel's experiments Emmert adopted a somewhat different plan, as he found it difficult to keep the rabbit's ear under water for long periods of time without bringing about conditions which interfered with the experiment. An arrangement was made by which, without much distress to the animal, one leg could be kept under water. It was found that under normal circumstances the time at which the evidences of inflammation set in varied so greatly that it was necessary to retain the leg under water for at least twelve hours, by which time, in the control animals, the inflammation invariably came on. The experiments showed that, by immersion of the lower half of the left hind leg in water at a temperature of from 12° to 15° C., the croton oil inflammation was delayed as long as the leg remained in water. Some of the experiments were continued as long as thirty hours. Another series of experiments, in which the leg was immersed after the inflammation had begun, showed distinctly that the inflammatory process stopped at the point which it had reached at the beginning of the bath.

With regard to the explanation of this phenomenon, Emmert differs from Samuel. He noted, contrary to the observations of the latter, that the temperature of the animal always fell several degrees, and that this fall in temperature always preceded the disappearance of the inflammatory process. It was found, further, that if, while the leg was still in the bath, the animal was warmed so as to prevent this fall of temperature, the inflammation occurred exactly as in the control animals. In another animal exposed simply to cold air there was also a marked fall of temperature and a material delay in the onset of the inflammation. He concludes that the observation of Samuel that the immersion of one extremity of a rabbit in a cool fluid is sufficient to hinder the development of a croton oil inflammation in another part, is true ; that, indeed, the antiphlogistic action of this procedure is even greater than Samuel suspected. Emmert's experiments, however, appear to show that the delay and prevention of the croton oil inflammation depends not upon any special action of the cold on the leucocytes in the exposed area, but upon the marked fall of temperature throughout the whole animal's body. Unfortunately, the practical application of the procedure in man is not possible, experiments by Leube and others having shown that the local application of cold in human beings produces relatively a much less fall of temperature than in animals.

Generalized Tic Convulsif Cured by Respiratory Gymnastics.—Pitres (*Journal de Mèdecine de Bordeaux*, 1901, xxx., p. 106) presented to the Medical and Surgical Society of Bordeaux, on February 2, 1900, a young man, aged twenty years, who had suffered for eleven years from a convulsive tic of unusual intensity. Every six or eight seconds the patient had violent spasms as rapid as if they had been provoked by electrical discharges, which resulted in quick, sharp movements of his head, trunk, or extremities, accompanied by a sudden expulsion of involuntary cries or inarticulate groans. The health of the patient was good. He was able to eat and sleep, but the movements interfered with his work and resulted in

his avoiding others for fear of ridicule. It was noted that when the patient sang or counted at the top of his voice, or when he took deep, regular, rhythmical inspirations, the attacks diminished considerably in frequency, and it occurred to Pitres that they might be influenced by gymnastic respiratory exercises analogous to those which are commonly employed in the treatment of stuttering. Pitres has recently applied similar methods with success in the treatment of certain more simple tics. Three or four times a day, for ten minutes, the patient was placed with his back against a wall, and was advised to take as slow and deep respirations as possible, raising his arms during inspiration and allowing them to fall during expiration. From the beginning the attacks became less frequent. A month later the amelioration was very evident. At this time the patient had to return to his home. He continued the exercises, however, regularly, and in three months the attacks had become rare. Nine months after treatment none whatever were present, the patient was at work and was apparently entirely cured.

[This case is particularly remarkable in that so good a result appears to have been attained in a tic of so long duration.—W. S. T.]

The Freezing Point of the Blood in Typhoid Fever.—RUMPEL (*Münchener med. Wochenschrift*, 1901, xlviii., p. 223).

In the *Deutsche medicinische Wochenschrift*, 1900, No. 46, Waldvogel published some observations tending to show that the freezing point of the blood in typhoid fever differed materially from that observed under normal conditions. Rumpel, who had already made some observations upon a similar subject in an article which is shortly to appear, being inclined to doubt the methods of Waldvogel, repeated the experiments. Waldvogel's observations showed a remarkable increase in the osmotic tension of the blood in typhoid fever, which resulted in the falling of the freezing point to —1.68° C. The results were striking in that the blood concentration in an osmotic sense is very constant, the freezing point varying, according to Rumpel's observations, extremely little—from —0.55° to —0.57° C. Waldvogel, in his observations, used the blood serum of typhoid patients which had been taken for the Widal reaction, the blood having twice remained twenty-four hours upon ice. As the quantity of the serum which was used was too small for the determination of the freezing point, it was diluted several times with distilled water. Instead of the ordinary glass cylinder of Beckmann's apparatus a wide test-tube was used, and in place of the mixer the thermometer itself. Apart from the various sources of error which must be connected with this method of procedure, Rumpel saw in it no great simplification of the ordinary method; and in his observations he took 15 cm. of blood directly from the vein, introducing it immediately into the cylinder, and making the estimation immediately after defibrinating the blood, by stirring with a platinum ring. By making comparative tests according to his own method and that of Waldvogel, he was able to demonstrate the many sources of error in the former. He then made estimates of the freezing point of the blood in eleven cases of typhoid fever which were at that time in the hospital. The examinations were made at various different stages of the disease. In all instances these showed an entirely normal blood concentration in an osmotic sense—that is, the freezing point varied between —0.56° and —0.57°.

The author observes that, owing to the few investigations, one is not justified in assuming that the osmotic tension of the blood in typhoid fever is always normal, but that, in comparison to Waldvogel's twenty-two cases, his eleven, in which the examination was made in a more careful manner, showed no abnormal deviation of the freezing point.

SURGERY.

UNDER THE CHARGE OF

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Compression of the Pedicle of a Movable Kidney by a Distended Gall-bladder Containing Calculi.—REYMOND (*Revue de Chirurgie*, June 10, 1900) states that it is not always possible to diagnose between these two conditions, and the diagnosis of the case becomes especially difficult when the two conditions coexist, as is well shown in the author's case, which was that of a woman, aged thirty-eight years, married, had five children, and one tubal pregnancy, the latter requiring operative interference for its relief. Eight days previous to her admission to the hospital violent exertion was followed by severe pain in the right flank; this was so severe as to make her keep in bed. Examination showed an irregular pulse, fever, pinched facies, but no trace of jaundice. Vomiting was persistent on attempting to take nourishment. The urine was normal. The patient complained of being always in pain, which at times became more acute; it was felt in the hypochondrium and right flank; some pain was felt along the course of the ureter, while at times it ascended to the right shoulder. The abdomen was distended, and so sensitive on palpation as to make an examination most difficult. On palpation a hard, irregular tumor, situated somewhat deeply, was noted in the region of the gall-bladder. There was marked dulness on percussion, and further examination enabled one to limit this tumor. It descended to two fingers' breadths below a horizontal line passing through the umbilicus; to the inner side it extended to the median line, while to the outer side its limits were less precise. The tumor had a pear-shape, and moved during respiration. Beyond the limits of this tumor was a second mass of more homogeneous consistence, situated backward below and to the outer side of the first tumor, and having the form of an enlarged kidney. These two masses could not be separately moved; they gave the impression of a bilobar tumor and not that of two separate and distinct tumors.

Operation. An incision was made in the loin over the tumor. On exposing the tumor it was found to consist of an hydronephrotic movable kidney and an enlarged gall-bladder. The kidney was secured in place in the usual manner, and the wound closed temporarily. Seven days later a cholecystotomy was performed, and sixty grammes of pus and four calculi were removed. The gall-bladder was sewed in the wound, and three weeks later the wound was closed and the patient made an uninterrupted recovery. Bacteriological examination showed the presence of the colon bacillus. The symptoms in this case pointed to the gall-bladder and also to the kidney. It is important to know if these two conditions are coincident or if one is produced by the other. According to Potain, the gall-bladder is the one primarily affected, while Roux claims that the displacement of the kidney is primary. It exercises traction on the cystic duct by the medium of the right border of the hepatoduodenal ligament, and thereby obstructs the course of the bile and favors the formation of calculi. Each of these hypotheses is more or less true, but it still remains to be shown definitely which one is right.

On Gonorrhœal Rheumatism.—Lorimer (*The Quarterly Medical Journal*, November, 1900) states the following conclusions: (1) That the different descriptions of gonorrhœal arthritis depend on the fact that a uniform type of ordinary rheumatism has not been taken as a standard of comparison and contrast, and, therefore, many of the alleged differences are not essential distinctions, but are simply dependent on the degree of pyrexia. (2) That, excluding cases of ordinary acute rheumatism occurring during gonorrhœa, there are three distinct forms of gonorrhœal arthritis: (*a*) The rheumatic form, in which the disease is at first identical with acute rheumatism, but as it proceeds the pyrexia becomes subacute, the migratory arthritis ceases and becomes fixed in one or two joints, where it runs a tedious and protracted course. It is in this form that cardiac complications may appear and that the analogies with ordinary rheumatism are more apparent. (*b*) The subacute type, or true gonorrhœal arthritis, constitutes the largest proportion of cases. Cardiac complications are seldom present; there is absence of acid perspiration, a stationary type of arthritis, a liability to chronic articular changes, sometimes suppuration, and marked muscular atrophy. (*c*) The chronic asthenic type, frequently monoarticular in scrofulous subjects, with hydrarthrosis and frequently effusion of seropurulent fluid. (3) That scarlatinal rheumatism and gonorrhœal rheumatism have certain distinctions in common, such as rarity of cardiac complications and liability to suppuration; but, on the other hand, the fugitive character of the former contrasts with the persistent character of the latter. (4) That in regard to chronic articular changes, gonorrhœal arthritis occupies an intermediate place between ordinary rheumatism and arthritis deformans; for on the one hand, though the joints do not quickly return to their natural condition, they hardly ever proceed to further destructive changes.

Of the hypotheses which have been propounded to explain gonorrhœal arthritis the two chief are: (*a*) The neuropathic, which ascribes the arthritis to inflammatory irritation gradually propagated from the urethra to the sacral plexus and spinal cord, where it affects the trophic centres of the joints.

This hypothesis came into fashion with Charcot's description of arthropathies in locomotor ataxia. (1) But the articular lesions in ataxy and syringomyelia are different in character from those of gonorrhœal arthritis. (2) It has to explain why the degree of irritation is in no way related to the articular and general symptoms; why new joints become affected while the irritation is subsiding, and why, in the most violent cases of urethral irritation, gonorrhœal rheumatism is rarely observed. (3) Moreover, it does not explain the abarticular phenomena of the disease. (4) It fails to explain those cases of arthritis following ophthalmia neonatorum without urethritis. (*b*) The toxæmic, viz., that the arthritis is due to the dissemination of a specific micro-organism—the gonococcus—a hypothesis which is believed to offer a better explanation of the phenomena of the disease, but which, however, is still sub judice.

Intraspinal Cocainization from the Anæsthetist's Stand-point.—GOLDAN (*New York Medical Journal*, December 22, 1900) states that the possibility of extending the use of the method by making the injection into the cervical portion of the canal has recently been advocated and based upon the researches of Tait and Caglieri, who base their observations on three cases. In the first two cases 0.5 and 1 c.cm. respectively of a 1.5 per cent. solution of cocaine were used and produced anæsthesia in eight and five minutes respectively. In the third case, in which 3 c.cm. of a 0.5 per cent. solution were used, no anæsthesia was obtained after the lapse of one hour and twenty-eight minutes. This patient complained of cephalalgia, intense heat over the entire body, copious perspiration, and slight vomiting. The following day slight headache and weakness in the legs ensued. While it is true that the puncture of nerve trunks by a needle is harmless, the author fails to find any authority for saying that the puncture of the spinal cord is or may be harmless. We know that the cord averages but 1 cm. in diameter; to use the spinal puncture and injection in the cervical region, or any other above the second lumbar vertebra, means the introduction of a needle not only into the subarachnoid space but often the cord as well. Now, such a needle, no matter how fine, must do one of two things: it must either sever the fibres or push them aside, and as some of the columns of the cord are probably no longer than the needle itself, severing them would always have to be considered as a possibility. The cord tissue once severed, we are taught, never regenerates, and here the possibility of remote complications, such as ascending or descending degeneration, comes in.

It has been said that in those cases in which, for any reason, a general anæsthetic must be administered where the spinal puncture and injection have been performed it is surprising how quickly these patients are anæsthetized and subsequently regain consciousness. In the first place, these patients cannot be anæsthetized more rapidly than if they at first had not had cocaine, nor is consciousness more quickly regained or the quantity of the anæsthetic lessened. We must be fair and not accept as true that which is only apparently but not actually so. Is there any reason why a patient who has had an operation half-finished with cocaine, and in whom chloroform or ether has then been substituted, should have used more than half the quantity that he otherwise would? Is it not a fact, which all must admit

who have used the spinal method, that these patients are shocked? and, further, is it not true that patients in a condition of shock require lesser quantities of anæsthetics than those in whom shock is absent? To say that patients do not suffer from shock at all comparable with that from general anæsthesia is absolutely untrue. Only those who have seen patients in whom the lumbar puncture and injection have been performed, showing the extremely rapid and small pulse, from 120 to 150 a minute, and at times suddenly falling to half that rate and becoming full; the rapid and shallow respiration, the ashy-gray pallor, the at times slightly cyanosed condition of the skin, finger-tips, and mucous membranes; and the profuse perspiration, can say whether this is true. If this is not shock, what is it? And it is a shock so great in its intensity that it can be compared only with very profound chloroformization; it is a condition of which one experience is quite sufficient; and these symptoms have occurred in the experience of those who have used the method extensively, with so small a quantity in some cases as 1 c.cm. of a 2 per cent. solution (one-sixth of a grain of cocaine). From the stand-point of time-saving, of preservation of consciousness, or of convenience this method cannot commend itself in the vast majority of instances to either the patient or the surgeon in preference to general anæsthesia by either nitrous oxide, ether, or chloroform, properly selected and skilfully administered. It has been said that the method might be useful in cardiac, pulmonary, and renal diseases where a general anæsthetic is indicated. As the patients in whom the spinal anæsthesia has been employed often manifested at first an extremely small and rapid pulse, which was at times suddenly followed by a full, very slow pulse, it does not seem to the author to be compatible with safety, particularly in cardiac or pulmonary disease where there is any tendency to venous congestion. That one of Tuffier's patients died of asphyxia, and upon autopsy a pulmonary thrombus was found, can easily be explained by this marked circulatory depression. In renal disease the method may be of value in preference to a general anæsthetic. It has not, however, been shown as yet that even in such a case cocaine itself might not prove deleterious. The author has had such a case of renal disease where the surgeon considered a general anæsthetic contraindicated; spinal anæsthesia was attempted, and after two punctures and injections aggregating half a grain of cocaine, anæsthesia failed to be induced and chloroform was administered, with no untoward results during or after the anæsthesia. There are few patients requiring surgical interference that cannot take one of three general anæsthetics if properly selected.

Exclusion of the Intestine.—TERRIER and GOSSET (*Revue de Chirurgie*, December 10, 1900), after reviewing in detail a series of fifty-two cases, state, in conclusion, that at this time there is nothing to be gained by discussing the value of the operation of exc'usion with total occlusion of the part excluded, for the reason that all surgeons agree in rejecting this method of treatment. In the case of fecal fistula or of tuberculosis of the intestines the operation that should be given the preference is that of exclusion with partial occlusion of the part excluded. The future shall determine if the operation of choice for cases of inextirpatable cancer of the intestines is

unilateral exclusion and if the flowing back of the intestinal contents into the portion excluded is really to be feared.

A Fatal Case of Cocainization of the Spinal Cord.—GOILAV (*Bull. et Mem. de la Soc. de Chir. de Bucharest*, May 3, 1900) reports the case of a man, aged sixty-seven years, whose leg he amputated at the site of election under spinal anæsthesia. After withdrawing about one gramme of cerebro-spinal fluid an injection of 1.5 centigrammes of a 1 per cent. solution of cocaine was made between the fourth and fifth lumbar vertebræ. Anæsthesia was complete in fifteen minutes and was perfect throughout the operation. During the operation the patient complained of headache, for the relief of which one-half gramme of antipyrine was administered, with but slight effect. He was also given coffee, but the result was negative. The operation lasted forty minutes and then the patient was placed in bed between hot-water bottles. Two hours after the operation the patient had a severe chill, the temperature went up to 38° C., and the pulse became weak and frequent (102). Later, the temperature became 39° and the pulse 125, the throat, tongue, and lips very dry, and finally the patient became delirious. At intervals hypodermatic injections of caffeine and of ether were given, and finally two injections of serum, each of 500 grammes. Syncope soon came on and was followed by coma, and twenty hours after the operation the patient died. Perspiration and the secretion of urine were much diminished after the operation. The author states that he has employed spinal anæsthesia (cocaine) in two cases; in one there was the fatal result just described, while the other showed all the symptoms of pronounced cocaine intoxication, but recovered. In conclusion, it may be said that in those cases of obliterating arthritis complicated by arterio-sclerosis with thickening of the aorta the employment of intraspinal injections of cocaine is not only dangerous, but in some cases it may directly cause the fatal result.

Subperiosteal Fractures.—COTTON (*Boston Medical and Surgical Journal*, November 29, 1900) states that the usual type of green-stick fractures is, of course, subperiosteal, but beyond this the correspondence between the types is not close. The usual type of green-stick fractures is familiar enough. There is a giving away of the bone on the convex side—a tearing apart—while the concave side shows simply a bending of the cortical layer. There is deformity on account of the difficulty of returning the torn bone surfaces on the convex side back to the proper position, while the lack of mobility is insured by the intact layer of bone on the inner concave side, even apart from a locking of the torn bone surfaces and from the strength of the untorn periosteum. Some experiments were carried out on the cadavers of new-born and presumably normal infants to see how readily clean fractures could be produced and how much the periosteum hindered displacement at the time of breaking and on subsequent manipulation. Fractures were produced first by slow, forcible bending in the hands. There resulted: (1) In a femur: green-stick fracture; periosteum intact. (2) Tibia: green-stick fracture, with a Y-shaped fracture line; periosteum intact. (3) Tibia: exactly the same result—typical green-stick fracture. (4) Clavicle: the

bone could be bent double and back again, with some breaking of bony substance, but no definite fracture line. In none of these experiments was there any difficulty in forcibly reducing the fracture and bringing the bone back to the straight line or any necessity of completing the fracture to get good position—a much-mentioned measure which has seemed as unnecessary clinically as it proved to be experimentally. In conclusion, it seems that fractures in children showing no deformity and no appreciable mobility are not uncommon; that they might readily be overlooked; that they often need no reduction, having no deformity; that they repair with callus and quickly.

The Abortive Treatment of Gonorrhœa.—PLICQUE (*La Presse Medicale*, March 31, 1900) says that the object of the abortive treatment should not be to stop the discharge immediately, as such methods are not followed by the best late results, but are liable to produce deep injuries of the mucous membrane and give rise later to stricture, although the discharge stops immediately. The real object should be to stop the disease in the early stage, and by gradual treatment subdue the inflammation that is at the bottom of it.

There are three methods discussed: 1. That of Neisser, who uses the new silver salts in injections, argentamine enzomine, and protargol. 2. Janet's method, by the lavage of the anterior urethra with large volumes of solution of potassium permanganate under pressure, their strength varying from 1 to 4000 to 1 to 500. 3. The method of Nogués and Hagge—the irrigation of both the anterior and posteror urethra, whether there is a posterior urethritis or not, the only precaution being to use a weak solution (1 to 2000) for the posterior urethra.

The best clinical practice is to take the better of the two latter methods. Irrigations with large volumes of weak solution of both urethras, anterior and posterior, with the simplest technique is the best. When applied in the incipiency of the disease it cures 87 out of 100 cases. After the fifth day the proportion is 11 to 100; above that limit it is not justifiable. The treatment should not be continued indefinitely; it should stop as soon as the gonococcus disappears from the pus, or five or six lavages later. Solutions of 1 to 10,000 have an action as remarkable as the stronger. They have the great advantage of not provoking pain, serious reaction, or congestions.

The lavages should take in the whole urethra, and in fact, should be urethro-vesical, since the invasion of this portion of the urethra often takes place early. One can never be certain that it is not already present. The patient should always urinate before the lavage. The urethra is then rendered insensitive by injecting a 1 to 20 solution of cocaine into the whole urethra as the patient lies upon his back. It has also the advantage of suppressing the sphincteric reflexes and facilitates the penetration to the depths of the irrigation. The meatus should be carefully cleansed with cotton and boric-acid solution before any manipulation.

Guiard prefers a simple syringe of the fountain type that is uniform in action and conveys no sensation of the pressure exerted to the operation. The other form has the advantage of conveying to the operator an idea of the pressure and progress of the fluid through the urethra, and is capable of regulation. When used by the patient the fountain syringe is preferable. A pint should be passed at a height of about two feet for the syringe above

the bed, and another pint with an elevation of three feet. The entrance of the fluid into the bladder should be hoped for rather than avoided. Two lavages a day are sufficient. Where there is great toleration, as in old cases, the proportion may be raised to 1 to 4000. In favorable cases the discharge decreases, after five or six lavages, to a little, clear drop that moistens the meatus. The irrigations should then be made once a day, then every thirty-six hours, then every two days. The strength can be decreased to 1 to 10,000. If there are symptoms of a relapse, more frequent lavage is to be employed. The urethra remains receptive for some weeks. Indiscretions in diet, drink, or sexual indulgence provoke recurrences. The patient must, therefore, be kept under observation. The solutions must be made from a stock solution of 1 to 100. It is dangerous to use the crystals, for if they do not dissolve they pass into the urethra or bladder and cause intense burning pain.

Fracture of the Two Condyles of the Femur without Articular Phenomena.—GROGNOT (*Gaz. Med. de Nantes*, Nov. 3, 1900) states that the inter- and supra-condyloid fractures of the femur in which there are three fragments are characterized by a separation of the condyles on moving the knee-joint and are accompanied by a considerable articular sound. These, with the mobility of the fragments, constitute sufficient physical signs to make a diagnosis. He reports the case of a man, aged 66, who had a fall from a ladder. On examination the left leg was found to be rotated outward, and on measurement it was nearly three centimetres shorter than the other leg. The knee was not swollen and still presented its three normal depressions. About three centimetres above the upper border of the patella was a small wound, the upper lip of which was hard and elevated, while around it was a large ecchymosis. On palpation abnormal mobility was felt above the articulation with distinct crepitus; pain was referred to the anterior surface of the knee and the inferior extremity of the femur. The upper fragment was felt immediately beneath the skin at the anterior and internal part of the thigh. Probing showed that the wound in the skin was the result of the skin being pierced by the upper fragment. The popliteal space was in every way normal and the patella was freely movable. The diagnosis was made of supra-condyloid fracture of the lower extremity of the femur complicated by a wound communicating with the fracture. It was noted that in the region of the articulation there was no swelling, no synovitis, no transverse enlargement with movement of the condyles, and no interference with the movement of the patella, which are all symptoms of penetration of the joint. The wound was dressed antiseptically and continuous extension applied. On the thirteenth day the patient presented the symptoms of pneumonia, and on the nineteenth day after the accident he died. The autopsy showed that the lower fragment was in a correct position, but that this fragment was divided into two segments by a vertical line of fracture which passed exactly in the middle between the condyles into the articulation. At no time could crepitus be obtained from this intra-condyloid fracture as the condyles were maintained in place by an unbroken periosteum. There was no suspicion that the supra-condyloid fracture was complicated by the presence of another intra-condyloid fracture with penetration of the knee-joint, for there was an entire absence of symptoms which would have indicated such a complication.

PEDIATRICS.

UNDER THE CHARGE OF

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AND

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Staphylococcic Enteritis in Breast-fed Infants.—MORO (*Jahrbuch für Kinderheilkunde*, 1900, Band ii., S. 530) has undertaken to investigate the causation of an enteritis in breast-fed babies which cannot be explained by the ordinary causes due to dietetic errors in the mother or by such accidental disturbances as overfeeding or simple exposure to cold. He has examined in Escherich's clinic the stools of nurslings affected with dyspeptic troubles, and in a large number of these cases has found staphylococci.

This staphylococcic enteritis begins as an acute intestinal catarrh. Vomiting and loss of weight do not occur and fever is rare. The stools, which are acid in reaction, are ordinarily serous and are expelled in a jet. Recovery is the rule.

If the stools are examined by the staining method of Weigert-Escherich it is observed that the "blue" coli bacilli which normally exist in the stools of breast-fed infants are almost entirely replaced by staphylococci. Few at the beginning of the enteritis, they increase during the progress of the trouble and disappear as the infant recovers, when they are replaced by the blue coli bacillus. These organisms, whether white or golden, are not virulent for mice or rabbits. They manifestly come from the mother's milk, being derived from the skin or from the superficial parts of the galactophorous canals, and are swallowed with the milk. The reason why all breast-fed infants are not thus affected depends upon the number of organisms entering the milk, upon the resistance of the organism of the infant, and upon the bactericidal power of its digestive juices.

The Presence of the Proteus Vulgaris in the Stools of Dyspeptic Infants.—BRUDZINSKI (*Jahrbuch für Kinderheilkunde*, 1900, Band ii., S. 469) has examined the dyspeptic and fetid stools of a number of artificially fed infants in Escherich's clinic, and in all the cases found the proteus. Injected under the skin of mice, the proteus with its toxins caused death, but when cultures were mixed with the food of young dogs, kittens, or mice no diarrhœa or other morbid symptoms were produced.

Inquiring into the source of the contamination, the author examined samples of the raw or boiled milk employed in the service. The proteus was found in only one instance, in a sample of boiled milk which had remained for twenty-four hours in the hospital. It was also found that in boiled milk the proteus grew well, while in fresh milk only irregularly, and

in acid milk did not develop at all. The symptoms of auto-intoxication observed in dyspeptic children with fetid stools (pallor, weakness, loss of appetite and weight) are attributed to absorption of toxins formed in the intestine by the proteus.

Hereditary Syphilis in the Second Generation.—FOURNIER (*Wiener klinische Wochenschrift*, 1900, No. 43) has made a study of the progeny of forty-six marriages in which either both husband and wife had hereditary syphilis or the mother was affected and the father healthy. One hundred and forty-three pregnancies resulted, from which there were 39 stillborn infants, 43 abortions, and only 63 living children. Nearly all of these showed stigmata of degeneration, dystrophies, etc., and lesions, the most frequent of which were defects of eyes and teeth. These results show that children of the second generation are affected as markedly as are those of the first, and one may expect that these effects can be seen even in the third and fourth generations.

Three Varieties of Membranous Angina Produced by Organisms Other than the Klebs-Lœffler Bacillus.—Systematic bacteriological examination of cases of angina has shown that other micro-organisms than the Klebs-Lœffler bacillus are capable of producing membranous deposits which closely resemble in clinical appearance those of a true diphtheria.

WILLIAM G. BISSELL (*Buffalo Medical Journal*, December, 1900, p. 312) distinguishes three varieties of these non-diphtheritic anginas, due respectively to the streptococcus pyogenes, the micrococcus of sputum septicæmia, and the oïdium albicans. In the experience of the Bureau of Bacteriology of Buffalo, the oïdium albicans has never produced a membranous condition of the tonsils that has resulted fatally; but instances of streptococcic and sputum-septicæmic infections have frequently occurred, followed in several instances by death of the patient. These conditions cannot be classed with the contagious diseases in the true sense of the term, for though capable of transmission by direct inoculation they do not seem to be communicable. One fatal case of streptococcus angina in a child occurred in 1896, and Dr. Biggs, of the New York laboratories, stated that several fatal cases had occurred in New York. Another case reported to the author by Dr. Thomas Bagley, of Buffalo, was a severe streptococcus tonsillar infection in a boy, aged ten years, which apparently in the last extremity was cured by anti-streptococcic serum. The membrane extended from the tonsil to the pharynx, into the post-nasal passages, and entirely covered the soft palate; the right tonsil was completely covered.

A fatal case of membranous tonsillitis due to the micrococcus of sputum septicæmia occurred in Buffalo in 1897. The patient was a young woman, and death resulted about the tenth day of the disease.

As regards the oïdium albicans, many instances have occurred in the experience of the Buffalo laboratory in which the physician has recorded diphtheria and the culture revealed only an abundance of the thrush fungus. The membrane in these conditions has been noted as being present on the tonsils, the sides of the cheeks, the uvula, and, in one instance, a cast of the upper portion of the œsophagus was submitted for inspection. From the

sanitary stand-point, none of these non-diphtheritic anginas require quarantine.

A Method of Rendering Cow's Milk Easily Digestible.—VON DUNGERN (*Münchener medicinische Wochenschrift*, November 27, 1900) suggests the following plan: The milk can be first boiled, if desired. Just before feeding the milk is heated to the temperature of the body and slightly coagulated with a small amount of rennet; it is then stirred to break up the curd, which is thus comminuted, and the mixture resembles normal milk. Children take this readily and the danger of the formation of large, tough curds is obviated. The author has used this method extensively, with very gratifying success.

Glandular Fever due to Pneumococci.—LONDE and FROIN (*Revue mensuelle des Maladies de l'Enfance*, February, 1901, p. 78) report a case of so-called glandular fever (fièvre ganglionnaire) in a child, aged three years, which gives suggestive data on the etiology of this as yet imperfectly understood condition. The child's grandfather had died of pneumonia on August 16th, and had not been isolated from the child until the later stages of the disease. Shortly after the funeral the child developed coryza and a slight cough and was taken to the country, where she remained until about the beginning of September. Five days before coming home, after exposure to cold, she had become suddenly feverish; and on the following day swelling on the left side of the throat was noticeable. This was found to be due to enlargement of two glands, one submaxillary, the other retromaxillary. Pressure over the latter was distinctly painful, but over the other gave rise to little or no complaint. There was also diffuse redness of the pharynx, with coryza, but no stomatitis and no swelling of the tonsils or of the posterior pharyngeal wall. A certain degree of polyadenitis was noticeable. From this time on the redness of the throat rapidly disappeared, but fever of intermittent type continued for four days and the swelling gradually localized itself in the retromaxillary region. By September 15th the fever had disappeared and only slight swelling of the two glands remained. This was still noticeable a month later, and there were evidences of enlarged axillary ganglia and also of tracheobronchial adenopathy. Bacteriological examination of the throat at the height of the febrile stage revealed the presence of the pneumococcus of Talamon-Fränkel, which was fatal for guinea-pigs in twenty-four hours.

The actual causation of the adenopathy is attributed to the nasopharyngeal catarrh of three weeks' duration, aggravated by taking cold. The pneumococcus found in the throat had without doubt existed there in the same degree of virulence since the beginning of the coryza, which began about the time of the grandfather's disease and was probably contracted from that source. In this the case resembles Hirtz's case, reported to the Société des Hôpitaux, October 26, 1900. The term glandular fever seems to the authors to be justified in this case. The infection had been general from the start, and during its height it seemed that the adenitis was responsible for the recurrences of infection.

According to Neumann and Comby, this affection generally depends

upon a streptococcus. The interval between the coryza and the explosion of the glandular fever is explained by our modern ideas of the parasitism of the bucco-pharyngeal mucosa (Widal, Besançon). Conditions of resistance are essentially variable in man, and one can conceive that their etiological influence is preponderant in the diseases caused by our habitual guest, the pneumococcus.

A Case of Transmission of Measles from Mother to Fœtus.—TELESFORO FIORI (*Gazz. degli osp. e della clin.*, June 10, 1900) states that transmission of measles through the placental circulation has been recorded in only six instances. In fourteen cases of pregnancy complicated by measles there were eleven abortions or premature births. The infants born at term and attacked by measles almost all die in the first days of life.

The case observed by Fiori occurred in a grave epidemic. The mother was a peasant, aged twenty-two years, who had borne a child at term in 1897. On May 20, 1899, at the end of a second pregnancy, she developed a measles rash, which had almost disappeared on the 23d, the day after her baby was born. The infant, a girl, appeared to be fully developed; on the skin of the face and neck were morbillous macules of large size, leaving little interval of healthy skin. There was also conjunctivitis, lacrymation, and rhinitis, with a few râles in the lungs. By May 27th the exanthem had extended to the entire body. On June 1st desquamation had begun, and by the 6th the baby was entirely well.

THERAPEUTICS.

UNDER THE CHARGE OF

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Diabetes Mellitus and Salol.—DR. TESCHEMACHER, adopting the recommendation of Ebstein to use salol in diabetes, reports his observations on nine patients. Of these six were helped, in the others the action was *nil.* The action was developed independent of dietary regulations. The drug was given in comparatively large doses (fifteen grains) three or four times a day for five to six days. An interesting feature of this observation was that the polarity of the sugar in the urine was inverted. After the drug is discontinued the sugar slowly reappears.—*Therapeutisches Monatshefte*, 1901, Heft i., S. 23.

[The author's observation might have been of more service if he had indicated what the types of diabetes were that he was treating. As a general proposition it may be stated that while salol is useful in most instances of hepatic and in few of pancreatic diabetes its failures are by no means infrequent.—R. W. W.]

Dyspeptic Glycosuria and its Treatment.—Dr. Albert Robin, in the examination of the urine of 1600 patients suffering from gastric hyperæsthesia, found that 5.2 per cent. contained sugar. In one set of these patients alimentary glycosuria was in evidence; in a second there was a true diabetes, not differing from other forms of diabetes save in the matter of its origin. To this latter class he gives the name dyspeptic diabetes. It is a type distinctly amenable to treatment, although it may be converted into a persistent and chronic diabetes. This dyspeptic glycosuria may form a preface to chronic diabetes. The chief pathogenic factor, according to the author, is a lack of, or an irregularity in, the reflex stimulation of the glyconic functions of the liver. In the treatment of the simplest cases an absolute milk diet may suffice. If the glycosuria persists, moderate stimulation of the liver may be indicated. Antipyrine with sodium bicarbonate, sodium and potassium arsenites, codeine, belladonna, and valerian are among the best remedies for this purpose. Should the sugar continue and the line that separates glycosuria from diabetes be passed, the treatment recommended is as follows: Strict hygiene; one hour and a half before lunch and dinner a powder consisting of antipyrine and sodium bicarbonate, āā three grains, should be taken in a little Seltzer water. Vichy water to be taken during meals. After eating the patient should take a powder of calcined magnesia, sodium bicarbonate, and prepared chalk, āā about ten grains. If there are severe attacks of pyrosis with augmentation of the sugar, Robin advises the following: Calcined magnesia, ʒlv; bismuth subnitrate, ʒij; prepared chalk, ʒij; codeine, gr. i; sodium bicarbonate, ʒijss. Divide in ten powders, to be given in intervals between eating. Proper dietetic measures should be followed. Fowler's solution in three to five-drop doses, t. i. d., may be of service as accessory medication.—*Revue de Thérapeutique*, 1901, No. 68, p. 103.

Treatment of Diabetes.—Dr. Van Noorden, in a study of some 600 cases of diabetes, gives the following general results obtained under varying lines of treatment. Jambul, used as the extract in drachm doses in water before luncheon and on retiring, is a good general drug. While it has no very marked action on the elimination of the sugar, in combination with diet and other hygienic procedures it is of service. In certain cases in which it seems necessary to increase the amount of carbohydrates ingested, the use of sodium salicylate, or of aspirin, is followed by a diminution in the amount of sugar, or, rather, the sugar excreted is held in check, notwithstanding the increase in the amount of carbohydrates taken. Carlsbad waters, especially when taken warm, have a beneficial action on the patients, especially on the dyspeptic symptoms. In a few instances the use of ordinary warm water has been followed by excellent results. As aids to special indications in the treatment a number of remedies may be useful. The salicylic acid compounds have a beneficial action on the pruritus; bromides

are valuable for the nervous symptoms, notably the insomnia and cardiac palpitations. Opium is indicated only for those patients who develop grave neurotic symptoms as a result of enforced dietary hygiene. Of the various analgesics, antipyrine is of service in the treatment of neuralgia. Diarrhœa, flatulence, or other intestinal disturbances are best treated by bismuth preparations. The salicylates have given the best results, notably the di-thio-salicylate or thioform.—*Deutsche Praxis*, 1901, No. 1, S. 1.

Treatment of Insomnia.—Dr. G. Lyon, speaking of the general lines of treatment, says that hygienic measures occupy a foremost place. Alcohol, tea, coffee, and tobacco should be stopped, and the diet regulated. It is unwise to permit such patients to eat too heartily, and all foods which have been found to digest slowly should be avoided. This is of importance, as patients should not be permitted to sleep while digestion is going on. The temperature of the sleeping room should not be above 60° F. It is inadvisable to have a fire in the room, and the windows should be open. From the stand-point of medicinal treatment he recommends for simple insomnia trional, chloralose, urethane, amylene hydrate, and somnal. In conditions accompanied with fever potassium bromide with a small amount of morphine is one of the best hypnotics. In insomnia from pain he recommends morphine hypodermatically, chloral, combined with morphine and hypnal, being analgesic from the antipyrine it contains. In certain special forms of insomnia definite medication is advisable ; thus for tertiary syphilis potassium iodide is of more value than hypnotics; in cardiac diseases, circulatory remedies; in paludal poisoning, quinine sulphate; in Bright's disease, a milk diet; in tuberculosis, morphine is of more value, and in insomnia of dyspeptics, dietary regimen.—*Revue de Thérapeutique*, 1901, vol. lxviii., p. 178.

Morphine and the Stomach.—Dr. B. Hirsch considers two features of the action of morphine on the stomach—its effects on the motor mechanism and on the secretion of normal hydrochloric acid. Fluids when taken by the normal stomach are passed into the duodenum in within ten to fifteen minutes, but under the influence of this drug there is a tonic spasm of the muscular fibres about the pylorus which prevents the stomach's contents from passing into the duodenum, at times for several hours. The hydrochloric acid is at first diminished, but it is later markedly increased. Both effects are ascribed to central influences in the medulla.—*Centralblatt fur innere Medicin*, 1901, No. 2, S. 72.

Chloretone.—Dr. E. Impens has made a most thorough study of this comparatively new hypnotic, which is produced by the action of acetone on chloroform. It may be termed a tri-chlor butyl-alcohol. It is naturally compared with chloral hydrate. After a long series of animal experiments the author shows that chloretone is two and one-half times as toxic as chloral hydrate; in small doses it has little action on respiration, but does diminish the inspiratory incursion. In large doses it reduces the respiratory effort at least 40 per cent., and the volume of respiration at least 60 per cent. It, therefore, diminishes pulmonary ventilation very markedly. Chloretone paralyzes the vasomotor centres and thereby induces marked dilatation of the

capillaries. There is a marked decrease in blood-pressure, at times as much as 43 per cent. This reduction is not alone due to its action on the blood-vessels, but it paralyzes the heart also. This toxic action is pronounced in doses sufficiently large to induce narcosis. Sleep is accompanied with lowering of the temperature, which is due at least in part to protoplasm paralysis. In one point alone does it prove more valuable than chloral hydrate, in that it is less irritable by reason of a slight analgesic action. He concludes by stating that chloretone is an extremely dangerous narcotic, much more dangerous than chloral hydrate.—*Archives Internationelles de Pharmacie*, 1901, No. 8, p. 77.

[This report is entirely at variance with clinical observation, which shows that chloretone in amount many times greater than the fatal dose of chloral hydrate merely produces profound sleep.—R. W. W.]

Colloidal Silver as a Specific.—Dr. P. Vietт advocates the use of colloidal silver as an efficient means of combating sepsis. He reports a number of illustrative cases, all resulting favorably. Should his results be substantiated, a distinct advance step in therapeutics can be recorded. He has used the unguentum Credè in larger doses than those usually prescribed (forty-five grains), using it in one inunction. In patients suffering from phlegmon, lymphangitis, and lymphadenitis his results were excellent. In one case of pneumonia inunctions over the chest were employed. The patient recovered promptly, but no special credit is given to the therapy, save that recovery began almost immediately after the use of the remedy. In two severe toxæmic cases of scarlet fever and in one of diphtheria favorable results followed promptly after the introduction of the treatment. The results were equally striking in two patients suffering apparently from acute appendicitis. Three patients suffering from puerperal sepsis recovered.

From his experience in the twenty cases reported the author is led to believe that as an effective agent against various pyogenic organisms colloidal silver should be regarded as taking first place, and that the results are certainly encouraging that an internal antiseptic has been made practicable. —*Allgemeine medicinische Central-Zeitung*, 1901, Nos. 19 and 20, S. 61 and 73.

Petroleum and the Treatment of Acute Articular Rheumatism.—Dr. Hector Sarafidis makes a careful study of the action of petroleum administered by massage in acute articular rheumatism. The remedy has a large use among the laity in oil-producing countries of Europe as well as here. The author, however, has made systematic observations with a view to determine its real value. As a result of its use by massage, ten minute *séances* once or twice a day, he concludes that the treatment of this disease by petroleum is one of the best modes of treatment known to him for several reasons. Its cheapness makes it universally applicable, at home and abroad, in touch with a pharmacy or not; it is not necessary to drug the patient; the petroleum alone will bring about a cure. It lowers the temperature very shortly. Its action is probably due to its action on the nerve filaments in the nervous membranes of the joints as well as a penetrating antiseptic effect. Complications of the endocardium were not recorded by the author. A further advantage is that it may be used in rheumatism accompanied by

Bright's disease, in which condition the salicylates are contraindicated.—*Revue de Thérapeutique*, 1901, vol. lxviii., p. 73.

Preventive Treatment of Hepatic Colic.—Dr. Chauffard outlines the indications for the prophylactic treatment of biliary calculi. The most important remedy is sodium salicylate. The work of Stadelmann, Doyen, and Dufour has shown that it is a powerful and persistent hepatic stimulant, non-toxic to the liver parenchyma, save in immense doses; and it thereby renders the biliary secretions more abundant, more fluid, and less liable to deposit calculi. In addition it is an excellent antiseptic, being especially valuable in mild infections of the gall-bladder, which are now held to be accountable for most of the calculi formation. The doses should be moderate, not over fifteen to thirty grains a day, preferably divided equally in three to six doses at meal times. Sodium benzoate may be combined with salicylate, in equal doses, but it is less energetic.—*La Semaine Médicale*, 1901, No. 1, p. 1.

On Tetranitrol.—Dr. M. Huchard, in a short résumé of his work on erythrol tetranitrate, speaks of this remedy as of much importance. He believes that in the early arterio-sclerotic changes, the presclerotic period, in the absence of pathological alterations, characterized by simple increase in tension, it is of great value. In confirmed arterio-sclerosis, in coronary angina, and in hyperdilatation of the heart from peripheral vascular constriction; in uric acid dyscrasia, in gout, in tabetic crises, and in interstitial nephritis this remedy is indicated. It has the great advantage of mild prolonged action. It commences to act in from fifteen minutes to three-quarters of an hour, and if continued in one to two-grain doses, four or five times a day, it keeps the bloodvessels in a state of reduced tension. It further avoids the disagreeable effects on the hæmoglobin induced by others of the nitrite group. The author has employed it in some one hundred and twenty patients during the past four years, and has found it singularly free from the unpleasant effects of nitroglycerin, such as pulsating temporals, etc. Mannitol nitrite has given similar results, quercite penta-nitrite also, hydroxylamine, a closely related body, is too irritating to the gastric mucosa. —*Bulletin de l'Académie de Médecine*, 1901, vol. lxv., p. 288.

[Personal observation shows that it is the most valuable of all the vasodilators for constant use. The apothecaries should use great care in dispensing else serious accidents may occur.—R. W. W.]

Obesity and its Treatment.—Dr. Strebel, in addition to the well-known dietary prescriptions, contributes some interesting details to the treatment of this obstinate condition. He adds the electric light bath to the usual procedures. Hot air baths constitute one of the best means of keeping the condition in check, but it is only too frequent that præcordial distress, palpitations, syncope, and vomiting are induced by this means; certain patients with heart trouble cannot take such baths. For such especially are the electric light baths available. Among the gymnastic exercises advised by the author is the familiar one of resting on one's back and coming to the sitting posture. This should be done regularly ten to twenty

times at a *séance*, once or twice a day, on rising and retiring. As a cardiac tonic he recommends camphor, preferably in oil used hypodermatically. The electric light *séances* are to be carried out twice a week. After an exposure of twenty minutes to an arc light the neck is enveloped in cold compresses and after the *séance* a bathing at a temperature of 86° F., followed by five minutes at 64° F., then massage and friction.—*Deutsche medicinische Zeitung*, 1901, No. 3, S. 28.

Antipyrine in Rheumatism.—At a recent meeting of the Société de Thérapeutique, Paris, M. LINOSSIER reported on the use of the newer aromatic synthetics in rheumatism. He believes that in doses of forty-five to sixty grains a day the results are identical with those obtained from the salicylates, and the disagreeable effects much less. He further thought that antipyrine had a distinct effect in diminishing the tendency to pericarditis, endocarditis, and other cardiac complications.—*Revue de Thérapeutique*, 1901, vol. lxviii., p. 151.

Dymal.—DR. L. KOPP has made some studies on a new compound—didymium salicylate—which has been termed dymal. It is an impalpable powder, without odor or taste, and is best prescribed in the form of an ointment. In deep ulcers of the leg, cutaneous gangrene, and in burns, even of the third degree, it has proved of value. Its action as an antiseptic is demonstrated also in a variety of infected wounds. It is of value, in the author's hands, in eczema, in psoriasis, in hyperidrosis, in ichthyosis, and in pruritus. Its comparative inexpensiveness gives it an advantage over some of the newer products used for the same purpose. It is a chemical by-product.—*Therapeutische Monatshefte*, 1901, Heft 2, S. 127.

OBSTETRICS.

UNDER THE CHARGE OF

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Induced Labor, Symphysiotomy, and Embryotomy.—In the *Monatsschrift für Geburtshülfe und Gynäkologie*, 1900, Band xii., Heft 5, GROSS reports the case of a multipara whose first labor was terminated by embryotomy and whose second pregnancy was ended by induced labor. In the third pregnancy labor was induced, and the head descended partially into the pelvic brim, but came no further, the occiput rotating toward the promontory of the sacrum, with a large caput succedaneum developing. Symphysiotomy was performed and the forceps applied to the head. It was impossible to deliver the head, and craniotomy was accordingly done. The head was

found excessively hard, the sutures and fontanelles almost closed. The mother made a good recovery.

The pelvis in this case was considerably flattened, the external conjugate being 17 cm. As the patient was a multipara, the birth-canal, aside from the bony pelvis, was in a favorable condition for the delivery of the child. The choice of symphysiotomy, however, was unfortunate in view of the degree of pelvic contraction and the excessive comparative size and hardness of the head. The writer has collected three other cases from the literature in which symphysiotomy and the use of forceps failed to deliver the child, and in which embryotomy was performed in addition.

[In our experience, symphysiotomy is adapted to cases of slight disproportion only between the head and the pelvis. In well-marked disproportion the chances of fœtal death are too great to warrant the selection of the operation.]

The Importance of Bacteria in the Vagina as a Source of Puerperal Infection.—In the *Zeitschrift für Geburtshülfe und Gynäkologie*, 1900, Band xliv., Heft 1, STICHER contributes an interesting paper upon this subject. Reasoning from the anatomy of the vagina and the character of the tissues surrounding it, Sticher became convinced that bacteria from the skin or clothing must necessarily find access to this portion of the body. Water used in bathing must also be a possible source of contamination.

To determine the latter he caused patients to bathe in water containing cultures of bacteria, and afterward proved the presence of these germs in the vagina by inoculation tests with vaginal secretion.

While it is true that we cannot hope to exclude all bacteria from the birth-canal, we may find a rational explanation in clinical freedom from infection in the condition of the mucous membrane. So long as this is not bruised, lacerated, and rendered œdematous by frequent violent manipulation during labor, or by long-continued birth, bacteria found in the vagina are rarely the cause of infection. We can control by antisepsis the introduction of virulent germs by hands and instruments, and if we avoid injury to the mucous membrane of the birth-canal during delivery, and especially if we avoid the œdema which follows long-continued pressure from delayed labor, we shall do much to prevent serious infection.

The Advantages of Induced Labor.—In the *Centralblatt für Gynäkologie*, 1900, No. 17, GRUSDEW reports the case of a patient with a flat pelvis who had been pregnant nine times. By the induction of labor she had five living and healthy children and remained herself in good health. She came under his observation in the ninth month of pregnancy. At eight months' gestation and by the use of the bougie and elastic bags he was enabled to bring on a spontaneous labor, from which the mother and child made a good recovery. He cites his case in opposition to statistics which exaggerate the danger of induced labor.

[When the contour of the pelvis is considered it is found that the pelvis was flattened only in one diameter, and that its oblique diameters were ample. There is no mention made of the relative stature of the parent, and the reason for the induction of labor seems to be the pelvic contraction only.

In our experience, cases like the one reported are most successful for the induction of labor. If the oblique diameters are of good size it is almost invariably possible to bring an eight months' fœtus safely through such a pelvis. Where, however, the pelvis is symmetrically contracted or is markedly rhachitic, with irregular contraction, the chances for the survival of the fœtus are very greatly diminished.—ED.]

Pregnancy and Labor in a Patient who had Previously Suffered from Rupture of the Uterus.—In the *Monatsschrift für Geburtshülfe und Gynäkologie*, 1900, Band xii., Heft 1, p. 115, STROGANOW reports the case of a woman, aged twenty-six years, who was brought into the hospital in her fifth labor with symptoms of rupture of the womb. She was anæsthetized, a dead child extracted by forceps, and the after-birth removed. A complete rupture was found on the anterior wall of the uterus, extending into the lower uterine segment. Abdominal section was performed because of the continuous hemorrhage. It was found that the laceration began at the left round ligament and extended toward the right side to the ligament of the right side. The rent was closed by sutures and the abdomen closed. The patient made a good recovery and left the hospital.

A year afterward she presented herself at the end of her sixth pregnancy, the fœtus occupying the second position, the vertex presenting. Labor did not proceed actively, and was accordingly induced by the introduction of a bougie, followed by a tampon of iodoform gauze. The child presented by the breech and the cord prolapsed, so that the extraction of the child was necessary. On examining the uterus the site of the previous laceration was found thickened, and the stitches of the previous closure could be felt. On the third day one of the stitches was projecting into the uterine cavity; two days later it was removed. The patient made a good recovery and was discharged from the hospital, the pelvic organs being in a nearly normal condition.

The Treatment of Pernicious Nausea of Pregnancy by Therapeutic Abortion.—In *L'Obsétrique*, 1900, p. 230, MERLE contributes a paper upon this subject, in which he strongly advocates the instrumental emptying of the uterus in cases of pernicious nausea in which the patient's strength steadily fails.

He would give chloroform to obstetric anæsthesia, and, under antiseptic precautions, grasping the cervix with tenaculum forceps, he would dilate the uterus with solid dilators, and with the fingers remove the ovum. He would then wash out the uterus with a solution of bichloride of mercury and tampon it with iodoform gauze. He would cleanse the uterus with an instrument, somewhat resembling a brush, dipped in a solution of bichloride or a glycerin and creosote mixture.

[While we heartily agree with Merle in his decision to operate promptly so soon as the patient's strength fails, our method of performing this operation differs somewhat from his. After dilating the uterus with solid dilators we employ the douche curette, using normal salt solution, thoroughly sterile, or lysol, 1 per cent. We have endeavored to empty the uterus with the finger, but did not find the finger long enough to accomplish the purpose

thoroughly. After the uterus is emptied and douched it is tamponed with iodoform gauze. In our experience this procedure inevitably cures the nausea. It does not, however, arrest the progressive weakness which destroys the lives of so many of these patients.—ED.]

The Diagnosis of Early Ectopic Gestation with Reference to Menstruation.—In the *Archiv für Gynäkologie*, 1900, Band lxi., Heft 3, WEINDLER contributes an interesting paper upon this subject, in which he gives the results of his study of fifty cases of ectopic gestation. In each of these patients the history of menstruation was carefully obtained and the curve of each case drawn with reference to this factor.

Out of the 50 cases during the first month of ectopic gestation there were 18 tubal abortions and 1 rupture; in the second month of ectopic gestation 15 tubal abortions and 2 ruptures; in the third month 7 abortions and 3 ruptures, and in the fourth month 2 abortions. The remaining cases were those of pregnancy in a rudimentary cornu of the uterus. From these investigations the early interruption of ectopic pregnancy occurs most frequently as a tubal abortion, which is more common than rupture of the gravid tube, and this occurs most frequently during the first two months of ectopic pregnancy. A most probable cause for this condition lies in the fact that some pre-existing disease of the uterus, tubes, or ovaries is present in these cases, making it impossible for the gestation to proceed further.

In studying these cases the menstrual curve of the first months gives information of value. In eighteen cases where ectopic gestation was observed during the first month menstruation came on at the usual and regular time, but with increased bleeding. In other cases menstruation was slightly delayed and of increased intensity.

It is of interest to observe that in many cases in which ectopic gestation lasts longer than the first month menstruation occurs in almost normal manner. In these cases the diagnosis must be made without reference to menstruation by the detection of a tumor and the characteristic pain.

In cases where the ectopic gestation goes to the second, third, and fourth month there is disordered menstruation, usually amenorrhœa, until the time when rupture of the fœtal sac occurs, and profuse internal hemorrhage.

To summarize, menstruation is altered in early ectopic gestation as follows: Where ectopic gestation terminates in the first month it does so by a profuse hemorrhage at the time of menstruation at the end of the first month of gestation.

When the gestation goes on uninterrupted to the second or third month menstruation may be unaltered. Tubal abortion is not uncommon, and hemorrhage may occur at any time.

Where ectopic gestation persists to the third or fourth month menstruation may cease, no hemorrhage occurring until the rupture of the gestation sac.

Vaginal Cæsarean Section in the Treatment of Eclampsia.—DÜHRSSEN (*Archiv für Gynäkologie*, 1900, Band lxi., Heft 3) adds another to his cases of vaginal Cæsarean section, the operation being performed in this instance for eclampsia. The patient was a primipara, aged thirty-one years, with a

family history of pulmonary tuberculosis. She was between six and seven months advanced in pregnancy when eclampsia developed. On admission to the hospital the patient was a stout, fat woman, with œdema of the legs, abdominal wall, and labia, and dusky face. The pulse was strong and rapid and the breathing stertorous. The patient was completely unconscious, but had slight reflexes. The urine was highly albuminous; the fundus of the uterus was at the umbilicus; the child was in the transverse position, the right shoulder presenting, and the cervix was intact, but admitted one finger. The walls of the cervical canal were very rigid; the patient was having no labor pains.

As soon as possible she was delivered by vaginal Cæsarean section under chloroform. The operation consisted in inserting a wide, single-bladed speculum, which depressed the posterior vaginal wall. The cervix was grasped with two tenaculum forceps and drawn downward. The anterior vaginal wall was freed from its attachment to the cervix by a transverse incision made with scissors. The cervix was divided in the median line to the inner os. Two additional tenaculum forceps were then inserted to grasp the borders of the cervical wound, and the fascia and vaginal walls were joined to the cervix with two catgut stitches. The cervical incision was then continued upward through the lower uterine segment, when the fœtal membranes prolapsed and appeared in view. The speculum was then removed, and the tenaculum forceps grasping the cervix, combined version was performed, a foot being brought down and the child extracted. The delivery of the head occasioned some difficulty, and it was necessary to prolong the incision in the uterus for this reason. The placenta and membranes were readily removed by the finger and the uterus tamponed with iodoform gauze. The wound in the uterus was closed with six catgut stitches, while the external portion of the cervix was not brought together lest undue contraction should occur.

At this point free hemorrhage from the uterus began, accompanied by the contraction of the uterine muscle and the partial expulsion of the gauze tampon. The anterior blade of a speculum was inserted into the uterus and the uterus firmly tamponed with gauze, when the bleeding immediately ceased. The stitches were then tied and the transverse incision closed with catgut. A small strand of gauze was left to drain the space between the uterus and bladder. The vagina was then tamponed with cotton and a slight laceration in the perineum repaired. The entire loss was not greater than in a normal labor. The child lived an hour and a half, its measurements corresponding with those of the twenty-seventh week of gestation. The patient had no more eclampsia, and slowly improved. She developed a catarrhal pneumonia, probably of tubercular origin.

The wounds made by operation healed by first intention. The uterus was but slightly enlarged, anteflexed, and without discharge. The patient subsequently developed nephritis, and died of heart-failure some time after her discharge from the hospital.

We are indebted to Dührssen for his method of rapid delivery by free incision in the cervix, accompanied, if necessary, by a central incision of the pelvic floor and perineum. He is especially interested in the development of vaginal Cæsarean section, and believes that the field of this operation

embraces those cases where the obstacle to labor lies in the muscular tissues of the birth-canal, with danger to the mother and child through lack of dilatation in the cervix. In cases of carcinoma of the neck of the womb he recommends this operation, followed immediately by vaginal extirpation of the uterus. His experience embraces up to the present time twenty-two operations of this kind, of which sixteen were performed for carcinoma of the cervix complicating pregnancy, two for eclampsia, two for stenosis of the cervix, one for uncontrollable vomiting, with polyhydramnios and stenosis of the cervix by scar-tissue, and one from fatal disease of the heart in a moribund patient. Of these sixteen, three died, and in each of these cases no complication occurred with the operation, the patient perishing from the disease which originally threatened her.

[It is evident that this mode of delivery must be limited to those cases in which the bony pelvis is sufficiently large to allow the child to pass readily. With these restrictions the operation seems to have a field of decided usefulness.]

GYNECOLOGY.

UNDER THE CHARGE OF

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Reproduction of Uterine Fibroids.—DOLÉRIS (*La Gynécologie*, 1900, No. 12) reports four cases of myomectomy in which small fibrous nodules which were regarded as insignificant at the time of operation subsequently developed to such an extent as to require removal. In view of his experience in these and similar cases, the writer has decided to remove only pedunculated tumors or those which are easily accessible, where the uterus appears to be of normal size. He thinks that the dangers of hemorrhage and sepsis have been underrated. In future the indications for myomectomy will be limited.

Transplantation of the Ovary.—MAUCLAIRE (*La Gynécologie*, 1900, No. 12) reports seven cases of subcutaneous transplantation, and reviews the literature quite thoroughly. In four cases the grafted ovary became infected and was removed a few days later. In the three others it could be felt three months after operation. He concludes that the ovary can be successfully transplanted both from the same and from a different individual, provided that it be absolutely aseptic.

Disturbances of menstruation and troubles following single or double oöphorectomy may be relieved in this way. If it is not deemed advisable to leave the ovary within the abdominal cavity, subcutaneous implantation may be tried, but never in cases in which infection is suspected. If there is a rise of temperature within twenty-four hours after operation, the ovary should be promptly removed.

Appendicitis and Disease of the Adnexa.—DELAGÉNIÈRE (*La Gynécologie*, 1900, No. 12) reports twenty-six cases of appendicitis associated with diseased adnexa, only four of which were acute. He believes that the inflammation of the appendix is usually secondary to its attachment by adhesions, thrown out in consequence of disease of the right tube and ovary. The interference with the circulation of the appendix renders it peculiarly liable to become inflamed. The type of inflammation is usually subacute or chronic. This explanation does not apply to all cases, since in some it is clear that appendicitis was the primary condition, the adnexa being infected through the lymphatics in the adhesions. As regards the symptoms, in cases of appendicitis secondary to disease of the adnexa there is usually a history of former uterine or tubo-ovarian trouble, while the intestinal symptoms are less striking than in a case of primary appendicitis. The attack is apt to correspond with the beginning of the menstrual period, while in disease of the tube and ovary it reaches its greatest severity toward the end. In suppurative appendicitis the pain is more severe, but it may extend below McBurney's point into the painful zone of adnexal disease. In non-inflammatory affections the diagnosis is less difficult.

The writer prefers a long median incision, even in cases of suppurative appendicitis complicating disease of the tubes and ovaries, since it may be advisable to remove the uterus. The appendicial abscess can be protected with gauze and the cavity drained through a counter-opening in the loin.

Fibroma of the Vagina.—GRUZDER (*Wratch*, 1900, Nos. 8 to 10) reports three cases and analyzes eighty-five which he has collected from the literature. Twenty-five patients were nulliparæ. The youngest was fifteen months and the oldest seventy-one years. The anterior vaginal wall was most often affected, the tumor usually developing from the submucous layer. These neoplasms are usually fibromata, and are rich in blood- and lymph-vessels, hence the frequent occurrence of interstitial hemorrhage and suppuration. They are usually encapsulated. They grow slowly and rarely reach a considerable size, the largest recorded being ten pounds.

The symptoms due to these growths are largely mechanical, varying with their size. They are most apt to be mistaken for cysts, the diagnosis being made by explorative puncture. Interstitial fibromata are difficult to distinguish from similar growths in the lower uterine segment, dermoids anterior to the uterus, and echinococcus cysts of the pelvic connective tissue. Tumors in the vaginal wall as they enlarge tend to encroach upon the canal, which is not true with paravaginal neoplasms. Pedunculated sarcomata would only be recognized on microscopical examination unless they cause constitutional symptoms. While the prognosis is usually favorable, these growths may suppurate or undergo malignant degeneration, while if they attain a large size they may cause dystocia.

The removal of polypoid tumors is simple, but the enucleation of interstitial fibromata may be quite difficult and attended with hemorrhage and suppuration.

Uterine Calculi.—RATHINSKY (*Wratch*, 1900, No. 2) reports three cases in which the uterus contained one or more calculi varying in size from a pea

to a walnut. In one post-mortem specimen the fundus uteri had been perforated by a sharp angle of a calculus. These bodies were composed of phosphate and carbonate of lime, which were dissolved by muriatic acid, leaving traces of connective tissue in a state of hyalin degeneration. The writer regards them as simple calcified uterine fibromata. As regards the treatment, when the bodies are small they may be removed per vaginam after dilating the cervix; when they are of large size it may be necessary to perform vaginal or abdominal section according to their situation.

Endothelioma of the Uterus.—POHORECKY (*Archiv für Gynäkologie*, Band lx., Heft 2) adds a fifth case to the four already described. The growth was discovered in a patient, aged forty-three years, being situated in the posterior lip of the cervix and bleeding freely after coitus. It was composed of a fibrous stroma, with alveoli filled with polygonal cells of an epithelial type. These cells were also distributed irregularly throughout the stroma. Lymph-spaces were observed, the cells of which seemed to have no relation to those in the interspaces or alveoli. At the base of the tumor were observed small nodules of a similar structure, which were evidently outlying foci of disease. It was evident, also, that the neoplastic cells were carried through the lymph-channels.

Treatment of Vesicovaginal Fistula.—SPASSOKONKOZKY (*Centralblatt für Gynäkologie*, 1900, No. 25) describes the following method of closing a fistula: Several sutures are passed between the vaginal and vesical mucosa. While traction is made upon these a bistoury is introduced between the sutures and the vaginal mucous membrane and a flap is dissected off. The sutures are then threaded in the eye of a catheter and are drawn through the urethra and out at the meatus. The vesical flap is thus inverted into the bladder, while the vaginal edges of the fistula are easily approximated, after which the temporary sutures are withdrawn per urethram. This method was employed successfully in five cases.

VEBER (*Wratch*, 1900, No. 28) describes a complicated case of fistula resulting from gangrene of the vagina, in which, after two failures, he succeeded in closing the fistula by taking skin-grafts from the inner surface of the thigh.

VITRAL (*La Gynécologie*, 1900, No. 6) found by experiments that the ventral decubitus is most favorable not only for the spontaneous healing of small vesicovaginal fistulæ, but in order to insure success after operation. As the position is not a natural one, the patient should become accustomed to it before operation.

Uterine Fibrocyst of Unusual Size.—KNAUER (*Centralblatt für Gynäkologie*, 1900, No. 48) reports the case of a patient, aged forty-eight years, with an abdominal enlargement of six years' standing, which had caused extreme dyspnœa, rapid heart-action (pulse 160), and rapid emaciation. On auscultation a loud heart-murmur and general bronchial râles were heard. The abdomen was enormously enlarged, measuring sixty inches in its greatest circumference. The tumor was fluctuating, and a diagnosis of probable ovarian cystoma was made.

On account of the condition of the patient the operation was performed under cocaine anæsthesia (Schleich's method of infiltration). On tapping the cyst twenty litres of bland fluid escaped. The growth was intraligamentary and was removed in pieces, profuse hemorrhage resulting. The right ureter was dissected off for a space of four inches. The sac was stitched into the abdominal wound and drained. The patient made a rapid recovery. Histologically the neoplasm proved to be a cystic fibromyoma, and although it had no connection with the uterus it was inferred that it had probably originally developed from that organ, the pedicle having become separated. The solid portion weighed eleven pounds, so that it was estimated that its entire weight was fifty-five pounds.

Formal in the Treatment of Uterine Hemorrhage.—GERSTENBERG (*Centralblatt für Gynäkologie*, 1900, No. 34) reports a series of cases in which he applied concentrated formal within the uterine cavity. A 40 per cent. solution of formaldehyde was introduced on an applicator without causing pain or other bad effects. The patient was kept in bed for two days. It may be necessary to repeat it once or twice. This treatment is especially useful in climacteric hemorrhages, or where curettement is contraindicated.

Intestinal Obstruction after Vaginal Section.—GERSUNY (*Centralblatt für Gynäkologie*, 1901, No. 48), commenting upon a case of ileus following vaginal hysterectomy, affirms that while it is desirable in cases in which gauze drainage is used that the bowels should not be moved until the infected area has been walled off by exudate, in simple cases, on the contrary, the opposite plan should be adopted. Even when the intestine has been sutured peristaltic movements can be induced before the third day by rectal impaction without endangering the wound. He allows his patients to drink freely and relieves flatus by glycerin injections, employing high enemata only when these fail.

Changes in the Endometrium in Connection with Fibroids.—PEHAM (*Centralblatt für Gynäkologie*, 1901, No. 48) describes a case of extreme hyperplasia of the endometrium in a fibroid uterus. The mucosa measured an inch in thickness and under the microscope showed marked glandular hypertrophy, their lumina being dilated so as to form large cavities lined with cylindrical epithelium. Many cysts were observed, filled with débris, the lining cells being flattened by pressure. When divided in their long axes they appeared tortuous and corresponded in length to the entire thickness of the mucosa. As the epithelial cells were entirely normal in their appearance and arrangement, there was no reason to infer the development of any malignant degeneration.

Torsion of the Fallopian Tubes.—VAN DER BERG ("Dissertation," abstract in *Centralblatt für Gynäkologie*, 1901, No. 48) reports a case of torsion of a pyosalpinx, with complete separation of the tumor, which he believes to be unique; also a similar case of hydrosalpinx, and another in which the tube was completely separated from an ovarian cyst as the result of torsion. He collected from the literature thirty-six cases, distributed as follows: hydro-

salpinx, 23; pyosalpinx, 5; neoplasms of the tube, 5; complete separation of the tube as the result of torsion, 3. He believes that while in the case of the larger tubal sacs torsion is due to the same causes as in ovarian tumors, in that of the smaller enlargements some other etiological factor must be sought, possibly the persistence of the infantile type, predisposing to inflammation. In these cases there may be a tendency to torsion from the beginning, which is favored by early closure of the uterine end.

The writer thinks that torsion of the tube occurs more frequently than is ordinarily supposed; in fact, that it is probable that this is a common cause of hydrosalpinx and of hæmatosalpinx not due to atresia of the genital tract. The attacks of colicky pain often noted in connection with these conditions may be thus explained. The importance of torsion in ectopic gestation is evident, since it may lead to rupture.

Torsion of the Pedicle and Uterus in Ovarian Cysts.—SONNENFELD ("Dissertation," abstract in *Centralblatt für Gynäkologie*, 1901, No. 48) found marked torsion of the pedicle in 50 out of 323 cases of ovarian cystoma (15 per cent.). No cases are included in which there was not obstruction of the circulation or torsion to 180° and more. Dermoids seemed to predominate. In two cases the uterus was twisted about its long axis to 180°.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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Toxic Amblyopia from Jamaica Ginger or Methyl Alcohol.—J. DUNN (Richmond) reports two of these cases in which a debauch, including the drinking of a large quantity of "essence" of Jamaica ginger, terminated in blindness. The cases resembled others of the kind previously reported. They were seen late, giving a history of very rapid loss of sight, followed by some improvement, and, later, by further impairment of vision. The optic nerves gave evidence of atrophy probably consecutive to neuritis.—*Virginia Medical Semi-Monthly*, January 25, 1900.

E. STIEREN (Pittsburg) reports the case of a man who, after drinking heavily on Saturday, got a dozen ounce-bottles of "essence" of Jamaica ginger and consumed it before noon on Sunday. He awakened at 3 P.M. totally blind. When seen at 6 P.M. the pupils were widely dilated and unaffected by light and accommodation. There was slight retinal œdema and blurring of the edge of the optic disk, and the sensibility of the cornea

was impaired. During the night the patient was given three hot foot baths, calomel, and compound jalap powder, each twenty grains, in divided doses, and two one-eighth grain doses of pilocarpin hypodermatically. Next morning he could count fingers at ten inches. The calomel and pilocarpin were continued for two days and then followed by large doses of potassium iodide. In five days vision had improved to 20/30, and subsequently became normal.— *Journal of American Medical Association*, January 5, 1901.

H. HARLAN (Baltimore) reports two cases, in which amblyopia had followed the use of "essence" of Jamaica ginger and "essence" of peppermint. The cases were seen several months after the onset, and showed atrophy of the optic nerves. One became entirely blind and in the other vision remained at 6/200 and 7/200.

Harlan ascertained what make of "essence" had been used by these patients. It was the same brand in both cases. He obtained a considerable amount of the essence of ginger and had it subjected to chemical analysis. The analysis showed that instead of being the pharmacopœia tincture of ginger, made with ethylic alcohol, it was deficient in ginger, the deficiency being covered by the use of capsicum, and the menstruum was a mixture of one part ethylic with three parts methylic or wood alcohol.— *Ophthalmic Record*, February, 1901.

[A year ago it was pointed out (*Progressive Medicine*, June, 1900) that the points of resemblance of so-called Jamaica ginger amblyopia to methyl alcohol amblyopia would justify a careful examination to determine whether this latter drug is used in the cheap essences of Jamaica ginger. The cases that have since been reported have still further illustrated the resemblance between the amblyopias ascribed to these two substances. Stieren's case, the only one of recovery after the use of essence of Jamaica ginger, naturally takes its place with Kuhnt's single case of recovery from methyl alcohol amblyopia. It should be noticed, also, that these wood alcohol "essences" investigated by Harlan were manufactured in Baltimore, and that nearly all of the cases of "Jamaica ginger amblyopia" have occurred in the territory of which Baltimore is a principal trade centre. Since methyl alcohol is known to cause amblyopia of just this kind the strong probability that all the essence of Jamaica ginger that caused this form of amblyopia consisted chiefly of wood alcohol, makes it reasonable henceforth to class all these cases as cases of methyl alcohol amblyopia.—ED.]

Quinine Amblyopia.—A. ALT (St. Louis) reports a case of quinine blindness in a woman, aged twenty-seven years. She took six grains every two hours until twenty-four grains were taken, and then four grains every two hours up to a total of forty grains. After taking eighteen grains disturbance of vision commenced. After twenty-eight grains she could barely recognize the lamp in her room. After thirty-two grains she was totally blind. In spite of this her physician next day ordered her to take forty grains more. Light perception reappeared after three days, and two months later she had regained central vision of 20/30 and 20/20 partly; but her fields of vision remained very much contracted.

In many years practice in a quinine consuming region, this is Alt's first case of unquestionable quinine blindness; but he thinks some of the cases

of optic atrophy he has previously observed might be of this character. Alt refers to a symptom not previously described in connection with quinine blindness which he himself experienced after taking sixty grains of the muriate in an hour. This is green vision, everything appearing of a bright emerald hue.—*American Journal of Ophthalmology*, January, 1901.

H. MOULTON (Fort Smith, Ark.) reports two cases coming to him as cases of optic atrophy of long standing in which the cause had not been suspected; but upon inquiry a reliable history was obtained of the origin of the trouble. It had followed taking very large doses of quinine in early childhood, after which the patients had for a time been completely blind.—*American Journal of Ophthalmology*, February, 1901.

[The part that idiosyncrasy plays in causing quinine blindness is well recognized. Alt's case is remarkable for the smallness of the amount of quinine that caused it and for the early appearance of the symptoms. Usually the blindness comes on after all other symptoms of cinchonism have disappeared, one, two, or three days having elapsed since the ingestion of the drug. These cases, especially Alt's, illustrate a reprehensible ignorance of the toxic effects of quinine on the part of some members of the profession.—ED.]

Ophthalmia Neonatorum.—GREENOUW (Breslau) reports a study of the clinical and bacteriological aspects of this disease in 100 cases. He finds that the inflammation of the eyes in the newborn, in simple conjunctival catarrh as well as in blenorrhœa, is due to a variety of micro-organisms, among which are the gonococcus, pneumococcus, streptococcus pyogenes, colon bacillus, and yellow staphylococcus. He finds that the same patient may show in one eye a severe blenorrhœa, while in the other the gonococcus conjunctivitis may assume the appearance of a simple catarrh. In general, blenorrhœa due to the gonococcus is marked by a more copious discharge and is of longer duration than that due to other forms of bacteria. Damage to the cornea is confined to gonococcus conjunctivitis or occurs rarely in other forms. If a single careful examination before beginning treatment, or after a sufficient interval has elapsed since the application of an antiseptic fails to relieve the gonococcus in the purulent discharge, the prognosis is entirely favorable.

The discovery of the gonococcus in the discharge is a positive indication for the use of silver nitrate or some other silver preparation. In three cases presenting gonococcus blenorrhœa of equal severity in the two eyes, one eye was treated with a 2 per cent. solution of the nitrate and the other with a 5 per cent. solution of protargol, and the pus was examined each day with counts of the cells showing gonococci. The results were practically the same in each case. In one case the gonococci disappeared from the eye treated with protargol one day earlier than from the eye treated with the nitrate. In the other cases the organisms disappeared from both eyes on the same day.—*Græfe's Archiv. für Ophthalmologie*, February, 1901

[In this trial the solutions used were not so strong as are often employed, and the protargol solution may be regarded as relatively the weaker. Certainly in solutions of these strengths the protargol would be very much the less irritant, and probably it would do less damage if improperly applied.—ED.]

DERMATOLOGY.

UNDER THE CHARGE OF

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Urticaria the Result of the Use of Formalin.—GLOVER (*British Journal of Dermatology*, April, 1901) reports the case of a young married woman, who, after the application of a lotion to the hair containing formalin in bay rum, suffered from a severe urticarial eruption which appeared the day after the first application was made, and grew worse after a second application. The eruption covered practically the entire body; the face was swollen, and great wheals were present on the trunk and extremities. It was considered that, in the absence of other possible factors, the formalin lotion was the cause of the eruption. The lotion, which still remained in the patient's room giving rise to the characteristic odor, was removed, bran baths were used, and improvement followed immediately.

A Peculiar Case of Dermographism.—FABRY (*Archiv für Dermatologie und Syphilis*, Band liv., Heft 1) reports under this title a remarkable case of chronic factitious hemorrhagic urticaria observed in a woman, aged sixty years. The affection began with the appearance of purpuric lesions in the upper eyelids and itching of the neck and breast. Scratching was followed by the appearance of hemorrhagic wheals. About a year before the death of the patient an enormous swelling of the tongue occurred which never disappeared. The pressure of the patient's clothing was sufficient to produce hemorrhagic wheals which, after lasting two to four weeks, gradually disappeared without leaving any pigmentation. These never appeared spontaneously, but were always the result of trauma. The disease lasted three years, and ended in the death of the patient from asthenia.

Lichen Ruber Pemphigoides.—BETTMANN (*Dermatologische Zeitschrift*, 1901, Band viii., Heft 1), after referring to the cases of lichen ruber reported by various authors in which bullæ were present, reports at some length a new case of his own, and discusses the following questions: 1. Do the cases of lichen ruber in which bullæ form represent a special atypical variety of the disease? 2. Is the formation of bullæ a consequence of the administration of arsenic rather than the disease itself? 3. Have we to do, in these cases, with a combination of lichen and pemphigus—*i. e.*, a combination of two different diseases? The author believes that, while in some of the reported cases the bullous eruption was most likely due to the use of arsenic, in others it represented a special variety of the affection. He does

not believe that these cases should be regarded as an accidental combination of two different diseases.

Psoriasis of Bullous and Rupioid Appearance. — HALLOPEAU and LEMIERRE (*Annales de Dermatologie et de Syphiligraphie*, 1901, No. 1) at a *séance* of the Société Française de Dermatologie et de Syphiligraphie exhibited a man, aged forty-seven years, with an extensive psoriasis, in whom one of the patches of eruption presented an unusual aspect. The lesions upon the trunk and upper extremities were of the ordinary type, but those upon the legs were covered with extremely thick, yellowish, hard, almost horny scales. These thick, slightly convex scales were surrounded by a ring of white epidermis which was apparently elevated by exudation underneath it. On removing this ring of epidermis, however, no fluid was found, but a whitish pasty material, which was composed of epidermic cells more or less degenerated with a few leucocytes.

Peruol in Scabies.—SACHS (*Deutsche med. Wochenschrift*, 1900, No. 39; *Dermatologische Zeitschrift*, Band viii., Heft 1) treated thirty-five cases of scabies successfully in the Breslau clinic with peruol. This substance, which represents the most active element in balsam of Peru, is a clear, odorless oil which does not irritate the skin nor soil the clothing, but is fatal to the itch-mite. After a bath (with soap, if the skin was not too much inflamed) the oil, diluted with three parts of castor oil, was vigorously rubbed in three or four times.

On Ringworm Infection in Man and Animals.—J. L. BUNCH (*British Medical Journal*, February 9, 1901) describes eight cases in which the fungus was derived from animals of various kinds; but it must not be supposed that this form of ringworm is common, because the author examined many animals which, though believed to be suffering from ringworm, really had other diseases. Valuable though microscopical examination is in enabling a diagnosis to be made, greater reliance must be placed upon cultures, which either confirm the conclusions derived from the microscope or serve to differentiate those cases in which otherwise a differential diagnosis could not be made. Cultures soon clear up the diagnosis. In cases, for example, where the spores are so closely packed that their shape necessarily appears round, the microscope is quite unable to distinguish between microsporon and ectothrix.

Trophic Disturbances in the Mammary Region Produced by the X-rays. —BARTHELEMY (*Annales de Dermatologie et de Syphiligraphie*, 1901, No. 2) at a recent *séance* of the Société Française de Dermatologie et de Syphiligraphie presented a patient, a woman, who had been treated by exposure to the X-rays for pain in the mammary region resulting from a blow. During this treatment, which lasted four months, the rays had not produced the slightest redness of the skin. At first the epidermis in the left mammary region became strongly pigmented over an area as large as two hands, and this was followed by sharp itching. Six months later superficial desquamation appeared in places, the epidermis coming off in large strips, as the hands desquamate

after scarlatina. The skin was thick, white over a considerable area, with red or violaceous zones here and there. Emphasis was laid upon the fact that the cutaneous lesions had first appeared five months after the last exposure to the rays.

Melanodermia with Cachexia and Pigmentation of the Buccal Mucous Membrane Due to Pediculosis Corporis.—CHATIN (*Annales de Dermatologie et de Syphiligraphie*, No. 12, 1900) reports the case of a man, aged seventy-eight years, who, in consequence of a severe pediculosis corporis, presented an intense pigmentation of the covered portions of the body with numerous slate-colored spots on the mucous membranes of the cheeks. The patient had also suffered from cough accompanied by great feebleness and emaciation for two months, and it was at first thought that he might be suffering from Addison's disease, but after a stay of three months in the hospital he lost his cachectic appearance, the melanodermia cleared up, and the pigmentation of the mucous membrane of the cheeks completely disappeared. The author briefly reviews the cases previously reported—nine in number.

Alopecia Areata.—O. LASSAR (*Dermatologische Zeitschrift*, September, 1900, p. 809), in considering the etiology of this disease, thinks that the irregularity of the manifestation, its sudden advent, the absence of symmetry, the generalization over all hairy regions, and the absence of other symptoms of disease of the peripheral nerves, render the trophoneuritic theory improbable. He thinks there is evidence of contagion and infection, but that the bacteriological theory still requires to be confirmed. The treatment usually adopted by him is antiseptic. The scalp is washed daily with a strong tar soap and treated then with a 2 per cent. corrosive sublimate solution, afterward with absolute alcohol with ½ per cent. naphthol, and, lastly, with 2 per cent. salicylic acid in oil. The galvanic treatment has not proved valuable in his hands. He recognizes only one variety of the disease.

Treatment of Rodent Ulcer by the X-ray.—J. H. SEQUEIRA (*British Medical Journal*, February 9, 1901) makes a report based on twelve cases, illustrated with several photographs. Of the twelve cases eight were still under treatment, and four were under observation, ten ulcers having healed. The cases were deemed to be unsuitable for surgical treatment. In one very severe case the patient could not bear the pressure of the special apparatus which is used in the Finsen method to render the parts under treatment anæmic. The current used was one of from three to four amperes. The coil was one producing a ten-inch spark, and the tube was placed about six inches from the ulcer, the adjacent parts of the skin being protected by a layer of lead-foil. The treatment lasted ten minutes, and was repeated daily. At the end of a week the ulcer was clearer and somewhat shallower. A month later the improvement was remarkable. In the course of another month the ulcer had almost entirely healed. An excised piece of tissue from the healed border showed it to be made up largely of connective tissue.

Pigmentation of the Skin from Drinking Beer Containing Arsenic; Peripheral Neuritis.—GALE and HALLAM (*Medical Press*, February 27, 1901,

p. 226) report eight cases of peripheral neuritis accompanied by pigmentation of the skin occurring among beer drinkers; the average amount of beer daily was three pints; six of the cases were women, two men. The illness began with digestive disorders, numbness and tingling sensations in the hands and feet, soon followed by loss of power in the arms and legs. All the cases presented the following signs: 1. Varying degrees of peripheral neuritis up to complete loss of power. 2. Brown pigmentation of the skin all over the body, most marked on the abdomen and chest, with, later, desquamation of the pigmented skin. 3. Thick desquamation of skin and redness of palms and soles. 4. The mental state was good in all but one case, a known alcoholic. Analysis showed the beer to contain arsenic in dangerous quantity.

Finsen's Light Treatment of Lupus and Rodent Ulcer.—MORRIS and DORE (*British Medical Journal*, February 9, 1901) present a lengthy and valuable article on this subject, the result of experimental work, concluding that although they cannot as yet make any definite statements as to permanent cure, the results attained have fully justified their expectations, and that they are of opinion that in these diseases better and more permanent results in the way of cure are to be obtained than in any other forms of treatment hitherto employed. In their experiments electric light instead of sunlight was used. A current of seventy-five amperes and about sixty volts was sufficient to produce a good reaction in the majority of the cases. All depends upon the reaction, this depending upon many factors, such as the focus being exact, the size of the focus, the clearness of the water and lenses, the quality of the carbons, etc. Reaction occurs in from five to twenty-four hours, is usually slight for the first few days of treatment, then becoming more marked, increasing rather than diminishing with continued treatment. After hyperæmia a bleb forms, bursts and dries, to form a thick yellow crust at about the end of a week, and in ten days or so the sore had completely healed. As is well known now, the treatment can only be carried out in an institution where the necessary complicated apparatus is at hand, as explained in the original articles of Finsen and Bie. Morris and Dore briefly sum up the advantages and disadvantages of the method. The advantages were reliability, painlessness, excellent cosmetic results, less liability to relapse, and avoidance of surgical measures. The disadvantages are the long time required, the small area treated at a time, and the expense.

Rodent Ulcer and Epithelioma Contrasted.—F. T. PAUL, of Liverpool (*British Medical Journal*, February 9, 1901), in a clinical lecture directs attention to the difference between these diseases, first stating that they are pathologically distinct in origin, appearance, and history. Great as the difficulty has been in deciding exactly what sort of carcinoma rodent ulcer should be considered, there is a general consensus of opinion among pathologists that it commences in one of the appendages of the skin in contradistinction to epithelioma which commences in the mucous layer. Rodent ulcer usually begins as a small whitish pimple in the skin, the surface of which is smooth and often shiny from thinning of the epidermis, while in epithelioma the affected area is roughened and often warty. Rodent ulcer is limited to skin tissue; whereas epithelioma may occur wherever squamous epithelium exists.

Rodent ulcer very rarely infects the lymphatic tissue. It tends in its course to marked erosion and destruction, destroying in its progress all kinds of tissue, and very rarely, except in the beginning, forming a solid formation or growth outward, and in this differing from epithelioma. Radical surgical treatment is recommended.

Epitheliomatous Giant-cells.—AUDRY (*Annales de Dermatologie et de Syphiligraphie*, 1900, No. 12) concludes a brief study of the giant-cells found in epithelioma, as follows: In Malpighian epitheliomata there exist multinucleated elements, plasmodia, occasionally very richly developed. These cells are of epithelial origin, and exist independently of any participation of the leucocytes. They probably represent a form of degeneration of the epitheliomatous cellular elements.

OTOLOGY.

UNDER THE CHARGE OF
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General Perichondritis of the Auricle.—A general perichondritis of the auricle occurs under three forms according to Pohl, viz., an idiopathic, a secondary, and a tuberculous form. The first named is caused by the entrance of infectious germs at some spot on the auricle or their absorption from the auditory canal. The second form, called secondary perichondritis, is the result of trauma or the extension of external otitis or some other inflammatory process from the external meatus. The tuberculous form is found, according to HAUG (*Langenbeck's Archives*, vol. xliii.), in individuals already manifesting symptoms of tuberculosis elsewhere, or presenting a hereditary tendency to tuberculosis. Haug has demonstrated the tubercular nature of such cases by an examination of portions of the diseased cartilage of the auricle as well as of the pus evacuated from the diseased tissue.

In perichondritis of the auricle there is a general involvement, redness, and tumefaction of the entire auricle. The disease is usually the result of some exterior irritant, like cold, or a skin wound of the auricle, and very often both auricles are simultaneously affected. Under proper treatment recovery ensues without deformity.

The treatment should consist in soothing antiseptic solutions or ointments to the affected parts, with attention to the general health of the patient. If effusion beneath the perichondrium occur it must be treated like a case of othæmatoma with effusion.

LEUTERT (*Archiv f. Ohrenh.*, vol. xlvii.) reports that in all of his cases of *perichondritis of the auricle* he succeeded in obtaining the B. pyocyaneus in pure culture. The perichondritis in each instance followed incision of the posterior wall of the auditory canal in the so-called radical operation on the

mastoid. He thinks it would be well, therefore, in the after-treatment of cases in which a radical operation has been performed to bear in mind the possible presence of the bacillus pyocyaneus and adopt measures for its destruction. In *abscess of the auricle* the staphylococcus albus was found and was considered to be the causative factor.

Excision of the Ossicles.—W. SCHROEDER (*Archiv f. Ohrenh.*, April 19, 1900) reports the results of one hundred and thirty extractions of the hammer and anvil in the treatment of chronic purulent otitis media. He shows that this is the only sure means of benefiting suppuration in the attic, so important, because so near the brain. This operation should always precede any form of radical operation on the mastoid, as the former will generally cure the chronic purulency and prevent mastoid caries. Mastoid radical operations are thus avoided. The results of excision of the malleus and incus in chronic purulent otitis media in public practice among the poor are 50 per cent. of cures; in private practice, 80 per cent. Caries of the incus was present in 88 per cent. of Schroeder's cases. In 41 per cent. of these cases the malleus was normal. The hearing was improved in 65 per cent.; unchanged in 22 per cent., and slightly impaired in 13 per cent. of these cases. Facial paralysis occurred in two instances, but disappeared without treatment in six weeks.

GRUNERT and ZERONI (*Archiv f. Ohrenh.*, vol. xlvi.) of Schwartze's clinic in Halle, express the very justifiable regret that excision of the malleus and incus, through the external auditory canal, has of late been superseded by the "radical operation" upon the mastoid for the cure of chronic purulent otitis media, even in cases in which the endeavor should have been made to check the purulency by the simple operation of excision. Although this fact can in a measure be excused on account of the difficulty of the technique of excision of the ossicles through the auditory canal, and also the possible necessity of a second operation if the excision of the ossicles has not led to a cure of the purulent otitis, yet in the interest of our patients it must not be underrated. In a large number of their patients observed for many years after excision of the ossicles through the auditory canal this operation has brought about a lasting cure. They also state that in a number of cases in which they have been called upon to perform the radical operation on the mastoid they have found conditions in this cavity which seemed to indicate that the excision of the malleus and incus through the auditory canal would have been sufficient to have cured the purulency in the middle ear, and thus prevented the mastoiditis leading to a mastoid operation.

Operations on the Mastoid.—GRUNERT and ZERONI (*Archiv f. Ohrenh.*, August 3d, vol. xlvi.), report one hundred and twenty-four operations on the mastoid performed in Schwartze's clinic in Halle. Twenty-eight of these were performed for the relief of acute mastoiditis, ninety-five for chronic mastoiditis, and one for the relief of neuralgia of the mastoid. The last named case was not cured. Of the acute cases twenty-three were cured; one died from meningitis; one suffered from pyæmia and was under treatment at the time the report was written, and in three cases the final results

were unknown. Among the acute cases was the youngest patient in the 124, viz., a child aged seven months. The results in the ninety-five chronic cases were as follows: Unknown, 25; not cured, 12; cured, 44; under treatment, 5; and 9 died. The oldest patient of the entire series of 124 cases was in this last-named class, viz., a woman aged sixty-nine years. Among the acute cases cured was one of pyæmia with ligation of the internal jugular, and one of pyæmia calling for operation on the sinus and ligation of the jugular. Among the chronic cases cured were two of pyæmia, operation on the lateral sinus and ligation of the jugular. Of the chronic cases four died of meningitis, four of pyæmia, and one of rupture of a cerebral abscess.

Mastoiditis from Use of Nasal Douche; Death from Leptomeningitis.—Grunert and Zeroni (*Archiv f. Ohrenh.*, August 3d, vol. xlvi.) have reported the case of a woman, aged fifty-seven years, who, by using a nasal douche, induced acute otitis media and mastoiditis. Chiselling open the mastoid was performed, and for four days the wound ran a normal course and entire convalescence seemed near at hand. On the fifth day after the mastoid operation fever, vomiting, and headache with deviation of the left eye (to the side opposite to the diseased mastoid) set in, and death occurred on the sixth day after the mastoid operation. The autopsy revealed purulent basilar meningitis with also purulent infiltration of the dorsal surface of the cerebellum, and pus in the posterior horn of each lateral ventricle. After removal of the dura of the base of the skull there was found on the anterior superior surface of the left petrous pyramid, between the labyrinth and the apex of the petrous bone, a loss of substance 4 mm. wide, filled with pus and reaching backward as far as the superior petrosal sinus, in which there was a somewhat firmly adherent clot. The labyrinth and carotid canal were free from pus. A grayish ostitic centre in the apex of the pyramid adjoined the deep extradural abscess.

It was held that the cause of the fatal purulent leptomeningitis was the deep-seated extradural abscess on the front surface of the petrous pyramid. In the absence of pus in the labyrinth of the ear and carotid canal one is forced to conclude that the course of the deep-seated extradural abscess was the intense otitis of the walls of the middle ear, extending all the way to the pyramid of the petrous bone. One learns from this case, that presented no suspicious symptoms, neither when admitted to the hospital, at the operation, nor for some days thereafter, how careful one must be in giving a prognosis even in an apparently harmless case of acute mastoiditis. A deep-seated extradural abscess, giving no size of its existence, may suddenly dash all hopes of seeing a patient recover, even after convalescence apparently has set in, as in the case reported above.

Chronic Suppurative Mastoiditis.—Latent mastoid empyema often presents the appearance of trigeminal neuralgia, or it may exhibit external symptoms slight in comparison to the internal underlying lesions in the mastoid cavity. In fact, even an extradural otogenous abscess may exist as a latent condition. If in the presence of otitic symptoms, especially if chronic, persistent pain continues anywhere on the side of the head corre-

sponding to the diseased ear, empyema of the middle-ear cavities from the attic to the mastoid without free outlet should be suspected. Pain now indicates either this condition or a graver one, viz., extradural otogenous abscess.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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Disinfectant Properties of Alcohol.—The conclusions arrived at by Epstein and others concerning the value of alcohol as a disinfectant have been corroborated by BERTARELLI (*Il Policlinico*, 1900, through *Revue d'Hygiene*, January, 1901), who experimented with silk threads, infected with fresh and old cultures of *B. prodigiosus*, *B. pyocyaneus*, *B. pestis*, *B. choleræ*, *B. typhosus*, *Staphylococcus pyogenes aureus*, and sporulating *B. anthracis* and *B. subtilis*, which were exposed at different temperatures and for periods ranging from five minutes to fifty days. The best results were obtained with alcohol of 50 per cent. strength, the power diminishing with departures in both directions from this dilution. Thus, 70 per cent. strength was more powerful than 25 per cent. strength, and both than 88 and 99 per cent. The action of any dilution on spores was practically nothing. Alcoholic solutions of corrosive sublimate (1 : 1000), carbolic acid (3 per cent.), chromic acid (1 per cent.), silver nitrate (0.40 per cent.), and zinc sulphocarbolate (2 per cent.) were more active the less the alcoholic strength.

Tin in Canned Foods.—Specimens of canned meats of various ages up to four years were examined by F. WIRTHLE (*Chemiker Zeitung*, 1900, xxiv., p. 263) with reference to the presence of tin and the probable influence of duration of contact on its amount. He concluded that the corrosive action increases slightly after the second year, and that the meat itself takes up a larger amount than the juice, but the amounts found in both were slight. The most marked corrosion occurs where the tin comes in contact with the fatty parts. With regard to the toxicological importance of tin in meats and fish, A. RÖSSING (*Zeitschrift für angewandte Chemie*, 1900, p. 147) asserts that the danger must be extremely slight and is unworthy of attention, for the compound formed is insoluble and so resistant to the action of the digestive juices that only the merest traces can be taken up. According to Wirthle, in some cases the compound is basic stannous chloride; in others a sulphide. Rössing believes it to be mainly an oxide.

Concerning the Anopheles Mosquitoes.—From the results of very numerous observations, PROFESSOR A. CELLI (*Journal of the Sanitary Insti-*

tute, January, 1901, p. 619) asserts that the larvæ of Anopheles live in water clean or foul, clear or turbid, acid or alkaline, and ferruginous, but not in water containing salt (salt marshes, sea water, and mixtures with fresh water in the proportion of two to one), very strong sulphur waters, nor water that is putrid from the putrefaction of animals and textile plants. They avoid water in which there is any movement (currents, ripplings, caused even by light winds; mechanical disturbance, as by the passage of boats), or which is without growth of aquatic plants, of which they prefer the filamentous species which do not occupy the whole free surface of the water where they rise to breathe. The mature mosquitoes bite in the evening and at night. They are transported by winds, in grass, hay, etc., and in vehicles of various kinds.

The old idea that putrid waters and the emanations therefrom are causes of malarial fevers is inconsistent with the fact that the specific gnats do not live in stinking waters, and the prejudice against brackish water and salt marshes on the score of being conducive to malaria is likewise inconsistent with repeated demonstrations that the larvæ cannot live in very brackish or salt water. He points out that all hydraulic improvements designed to free districts from malaria must sweep away the conditions favorable to the life of the infecting mosquitoes—must either remove fresh waters from the surface or put them in motion. When complete removal of marsh water is impossible, as is often the case where the movement of the water is hindered by vegetation, the larvæ have abundant opportunity for development; and even where currents exist, there are, along the edges, incurvations or grass where the larvæ hide. Hence, drainage canals should be periodically flushed at intervals of twelve to fifteen days to clear them of larvæ, and all marshy vegetation should be torn up as it grows. In malarial districts, dwellings should be built in the highest and dryest situations possible, though even there the mosquitoes may go or be carried, as happens in the highest parts of the Roman Campagna, which are greatly infested. Even the upper floors of tall buildings are not free from the visits of mosquitoes when they are hungry for blood, and all windows and outer doors should be protected against them by wire netting, and the screen doors should be provided also with springs to cause them to be kept closed when not in use. The walls of the rooms should be light in color, so that mosquitoes resting on them may easily be seen. Sometimes even the flue outlets of the chimneys should be screened. Trees in the near neighborhood of houses act as a hiding place for mosquitoes, which in the evening try to gain entrance, especially into rooms in which lights are burning.

In agricultural operations, he points out that no turning up of the soil can, as has been believed, be the cause of malaria. Irrigation cannot be detrimental, provided the water reaches the soil in no greater amount than it does in a shower of rain and the canals by which it flows in or out are not of such a character as to allow of stagnation. But ditches in which water becomes stagnant and vegetation accumulates afford good breeding facilities to the mosquitoes. Periodical flushing at intervals of twelve to fifteen days will overcome the difficulty. Rice fields cannot be made healthy, because, even though the water may run, there are always dead points where there is no current, and there the larvæ are protected. Moreover, the plants themselves afford a shelter.

According to *The Lancet* (March 23, 1901, p. 875), Dr. Patrick Manson has proposed an expedition to the Pacific Islands to investigate the causes of the apparently capricious distribution of the malarial mosquitoes, the presence or absence of which depends upon local conditions inimical to them. It is proposed to study the mosquitoes of an island where the disease is unknown and those of another where it is endemic, and then to convey the specific varieties to the non-malarial place for the purpose of attempting there to breed them under laboratory conditions and in the company of fauna and flora peculiar to the place, with the view to discover something antagonistic to their existence, which may then be introduced into localities where malaria is endemic.

Selenium Poisoning from Impure Beer.—At a meeting of the Royal Commission on Arsenic Poisoning, held on March 15, 1901 (*British Medical Journal*, March 23, 1901), in the course of the investigation of the recent extensive epidemic of arsenic poisoning due to beer made with impure glucose, Dr. F. W. FUNNICLIFFE stated that he and Dr. Rosenheim had found selenium in the incriminated sulphuric acid (used in converting starch to glucose) to the extent of about 0.3 per cent. He found also one part in 7000 of invert sugar. Examination of beer made with brewing material manufactured with acid containing selenium compounds demonstrated that the poison passes into the beverage. Animal experimentation has shown that the symptoms of selenium poisoning and of arsenic poisoning are in all respects similar. But the action of selenious acid is cumulative, and this helps explain the symptoms which were attributed to arsenic in cases in which the beer consumed contained but small traces of that substance. The marked occurrence of wasting was to be explained by the specific action of selenious acid, as might also the occurrence of symptoms in cases in which arsenic was not found in the ingesta.

According to Willcox (*The Lancet*, March 16, 1901, p. 778), while selenium gives no mirror in the absence of arsenic in the Marsh test, it has a most decided effect upon the nature of the mirror where arsenic is present. The proximal portion of the mirror is red in color, while the rest has the usual appearance; and the extent of the reddened portion varies according to the amount of selenium present. He found no selenium arsenic mirrors in an examination of many samples of arsenical beer.

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CONTENTS.

ORIGINAL COMMUNICATIONS.

PAGE

Cancer Distribution and Statistics in Buffalo for the Period 1880–1899, with Special Reference to the Parasitic Theory. By IRVING PHILLIPS LYON, M.D. . . 629

Chronic Myocarditis and Fatty Degeneration of the Heart. By BEVERLEY ROBINSON, M.D. 651

Osseous Cysts of the Tibia. By CARL BECK, M.D. 666

A Clinical and Histological Study of a Case of Circumcorneal Hypertrophy of the Conjunctiva. By CHARLES A. OLIVER, A.M., M.D. 671

Nitrous Oxide and Oxygen as a Surgical Anæsthetic. By S. ORMOND GOLDAN, M.D. 674

Croupous Pneumonia. By GEORGE WILLIAM NORRIS, A.B., M.D. 684

Heart and Circulation in the Feeble-minded. By JOHN MADISON TAYLOR, A.M., M.D., and F. SAVARY PEARCE, M.D. 691

REVIEWS.

Manual of the Diseases of Children. By J. Madison Taylor, A.M., M.D., and WILLIAM H. WELLS, M.D. 698

A Clinical Treatise on Fractures. By William Barton Hopkins, M.D. . . . 699

The Prevention of Valvular Disease of the Heart. By Richard Caton, M.D., F.R.C.P. 700

A Treatise on Diseases of the Nose and Throat. By Ernest L. Shurly, M.D. . 702

Progressive Medicine. Vol. I., 1891. Edited by Hobart Amory Hare, M.D., and H. R. M. Landis, M.D. 703

Infant-feeding in Health and Disease. By Louis Fischer, M.D. 705

PROGRESS OF MEDICAL SCIENCE.

MEDICINE.

PAGE

Excretion of the Bence-Jones Body in the Urine (Albumosuria) in Association with Myelomata of the Ribs 707

The Basophilic Granulations of the Blood-corpuscles 707

Etiology of Yellow Fever . . . 709

Pathology of Herpes Zoster. . . 711

SURGERY.

Prophylaxis in Asepsis . . . 714

Fractures of the Patella . . . 714

Intrapleural Injections of Nitrogen Gas in Tuberculosis . . . 715

Tuberculosis of the Spine . . . 716

Abscess of Breast in a Girl aged Sixteen Years 716

Hemorrhage into the Knee-joint . 717

Treatment of Scoliosis . . . 718

Gumma of the Spermatic Cord . . 718

PEDIATRICS.

Uricæmic Headache in Children . 719

Ductus Murmurs in the Newborn . 720

Congenital Abnormality of Heart . 720

Emphysema Complicating Measles . 721

THERAPEUTICS.

	PAGE		PAGE
Pharmacology of Anagyrine	722	Treatment of Epilepsy	725
Therapeutic Uses of Thyroid Extract	722	Urea in the Treatment of Tuberculosis	725
Suprarenal Extract in Hæmoptysis	723	A New Remedy for Gout	725
Active Principles of Digitalis Leaves	723	On Hedonal	725
Sodium Salicylate in Diabetes Mellitus and Glycosuria	724	Treatment of Acute Dysentery	726
Superheated Dry Air	724	On the Use of Formalin Administered in Glycerin	726
Sodium Cinnamate in Treatment of Tuberculosis	724	Some Fallacies in Therapeutics	726

OBSTETRICS.

Pregnancy at Third Month	727	Intrauterine Amputation	729
Hæmatoma of the Abdominal Wall Complicating Pregnancy	728	Two Cases of Cæsarean Section	729
The Use of Lysoform to Disinfect the Hands	728	Pregnancy in a Rudimentary Horn of the Uterus	729
		Version in Contracted Pelves	730

GYNECOLOGY.

Kraurosis Vulvæ	731	Operation for Retrodisplacement	732
Herpes in Women	731	Injury to Ureter During Ovariotomy	733
Treatment of Climacteric Disturbances	732	Entero-vaginal Fistula Following Vaginal Section	733
Torsion of Ovarian Tumors	732	Bacteria in the Urine	733
Retroflexion without Symptoms	732	Operation for Carcinoma Uteri	733

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

Bullous Enlargement of the Middle Turbinated Bone	734	Recurrent Tumor of Tonsil	735
Surgery of Maxillary Sinus in the Eighteenth Century	734	Stenosis of the Larynx	735
Adhesion of Soft Palate to Posterior Wall of Pharynx	735	Severed Trachea with Union by First Intention	736
		Continuous Sternutation of Seven Months' Duration	736

HYGIENE AND PUBLIC HEALTH.

Pathogenic Organisms in Milk	737	Alcohol and Susceptibility to Infection	739
Studies in Relation to Malaria	738	Disinfection of Tuberculous Sputum	740
Canned Meats	739	Plague and Rats	740

PATHOLOGY AND BACTERIOLOGY.

Punctiform Calcareous Bodies of Kidney Cortex	741	Histological Changes Produced by Freezing	742
The Histology of Chronic Fibrous Pneumonia	741	Fat in Pathological Tissues	743
		Occurrence of Lycopodium Spores	744